



Woodrow Wilson
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CHINA ENVIRONMENT SERIES

8

ISSUE 8, 2006



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Legal Advocacy in Environmental Public Participation

Evolving Civil Society: From Environment to Health

Reducing China's Thirst for Foreign Oil

Spurring Innovations for Clean Energy and Water Protection

Water Conflict Resolution

Energy: China and the North American Response

Plus: Notes From the Field, Spotlight on NGOs

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A view of the Nu River in Yunnan Province. © Ma Jun

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The China Environment Forum

For nine years, the China Environment Forum—a sub-project within the Environmental Change and Security Program—has been active in creating programming, exchanges, and publications to encourage dialogue among U.S., Chinese, and other Asian scholars, policymakers, businesses, and nongovernmental organizations on environmental and energy challenges in China. The China Environment Forum regularly brings together experts with diverse backgrounds and affiliations from the fields of environmental protection, China studies, energy, U.S. foreign policy, economics, and rural development. Through monthly meetings and the annual *China Environment Series*, the China Environment Forum aims to identify the most important environmental and sustainable development issues in China and explore creative ideas and opportunities for governmental and nongovernmental cooperation. The Wilson Center's Asia Program periodically cosponsors meetings with the China Environment Forum. The China Environment Forum meetings, publications, and exchanges over the past two years have been supported by generous grants from the U.S. Agency for International Development, Japan Foundation's Center for Global Partnership, Carnegie Corporation of New York, Blue Moon Fund, Tamaki Foundation, and Shell China, Ltd. Jennifer L. Turner directs the China Environment Forum.

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The Asia Program was created in 1977 and has grown over the past three decades into one of the Wilson Center's largest and most active programs. It strives to provide a forum for examining current Asia-related policy questions in their broad historical and cultural context. The Asia Program's activities focus on China, Japan, the Koreas, South Asia, and Southeast Asia. Since 1999, Robert M. Hathaway has directed the Asia Program.

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INVENTORY OF ENVIRONMENTAL AND ENERGY PROJECTS IN CHINA

Available online at www.wilsoncenter.org/cef

FOREWORD

Jennifer L. Turner, Editor

We mark the publication of “lucky” issue eight (*ba ba ba, fa fa fa*) of the *China Environment Series (CES)* with a new look. Since issue 1 in 1997, *CES* has had a simple cover with a red chop bearing the characters 中美环保关系, which mean “U.S.-China Environmental Relations.” Abandoning this chop and replacing them with shadow images of the five elements of natural phenomena in traditional Chinese philosophy (metal, wood, water, fire, and earth) does not mean *CES* no longer focuses on Sino-U.S. green relations. On the contrary, we wanted our new cover to subtly emphasize how our publication’s themes have been expanding. While we continue to address the many types of—and opportunities for—U.S.-China energy and environmental cooperation, we have increasingly been expanding our scope to look at how other countries are working in China. Our authors have examined more deeply China’s evolving internal environmental governance structures from emerging NGO trends to new public participation mechanisms. This issue offers new insights into environmental conflict resolution and environmental health. According to the five elements philosophy, all things are interconnected. We claim no such all-encompassing philosophy in our journal, yet wish simply to note that our articles are interconnected, in that all present strategies and ideas to help China onto a more sustainable development path.

Over the past two years, a growing number of environmental protests and pollution accidents have helped fuel a growing debate in China on how to define public participation (*gongzhong canyu*) in the environmental sphere. This wrestling over the definition of public participation has become, appropriately enough, a very public debate among the Chinese government, non-governmental organizations (NGOs), and citizens, as well as a focus of international environmental projects. Many *CES* 8 contributors explore public participation in environmental governance in China, while others delve into energy, water, and forestry challenges.

In our lead article, **Allison Moore** and **Adria Warren** provide an excellent discussion of China’s evolving legal framework for public participation in the environmental sphere. The second feature by **Drew Thompson** and **Xiaoqing Lu** delves into the emergence of HIV/AIDS NGOs in China, comparing their growth to that of green groups. **Hongyan He Oliver** discusses various progressive transportation policies and technologies to help China significantly reduce its “thirst” for foreign oil. Our fourth feature article by **Lü Zhi**, **Michael Totten**, and **Philip Chou** discusses the opportunities for China to leapfrog into a cleaner economy not simply by adopting, but by producing clean energy and water protection technologies.

Once again our Commentary and Notes From the Field section sparked a rich collection of research and reflections from NGO activists, researchers, government representatives, and students. Our opening commentary by **Anne Arquit-Niederberger**, **Conrad U. Brunner**, and **Zhou Dadi** highlights how new Chinese policies and development plans advocating stronger energy efficiency initiatives could enable China to become an impetus for a global climate policy breakthrough. Several authors discuss the work of their NGOs in helping to promote public participation in China—**Margret J. Kim** and **Robert E. Jones** from Ecolinx relate anecdotes and insights from their countless training sessions in the outback of China on how to carry out environmental impact assessments (EIAs); **Lila Buckley** discusses the unique role the Global Environment Institute has played in helping to strengthen the EIA process in China; **Christine Chung** describes positive trends and challenges in environmental permit hearings and other similar workshops in which the National Democracy Institute was involved. **Marilyn Beach**, **Bill Bleish**, and **Shelly Yang** take a different tact to the EIA topic in introducing the results of a needs assessment for capacity building in the area of ecological impact assessments that Fauna

& Flora International conducted in western China. **Wu Haoliang** shines a light on what he calls the “third wave” of China’s grassroots environmental movement, namely, the emergence of regional youth environmental organizations.

While China’s local governments are often weak in enforcing environmental regulations, a number of commentaries point out how provincial and sub-provincial governments can be innovative in complying with pollution control (**Wanxin Li**), promoting energy efficiency (**Lei Bi**, **Murray Haight**, and **Ben Greenhouse**), protecting forests (**Dave Daversa**), and pushing for innovative auto emissions control policies (**Isabella Notar**).

The statistics on China’s growing environmental degradation are grim, yet **James E. Nickum** and **Yok-shiu F. Lee** remind us to stop and think twice about some of the oft-repeated numbers in their piece examining the number of water-short cities in China. **Eric Zusman** offers an insightful comparison of how air pollution regulations have been made in Taiwan and China, highlighting this as a fruitful area for cross-strait collaboration. Introducing the unique partnership among Chinese and U.S. health and energy researchers, **Frederica Perera**, **Deliang Tang**, **Barbara A. Finamore**, and **Li Ting-Yu** present their ongoing research on coal burning and children’s health in Chongqing.

I am pleased and melancholy with our special report that contains papers written by our U.S.-China Water Conflict Resolution Working Group. The publication of these papers means the formal end of work with an incredibly smart and fun group of water experts from China and the United States. The working group members produced papers that not only describe similar water challenges in the two countries, but also demonstrate how water conflict resolution might prove to be a promising area for Sino-U.S. cooperation.

Perhaps the most well attended China Environment Forum meeting this year was in March when we invited **Xavier Chen** (BP China), **Jeff Logan** (World Resources Institute), and **Wenran Jiang** (University of Alberta) to discuss the North American response to China’s growing energy hunger. A summary of that meeting is featured in this issue.

Two types of boxes are scattered about the publication, short commentary feature boxes and new Spotlight on NGO Activism in China boxes. The latter boxes provide snapshots of China’s very dynamic green civil society, detailing some of the work presented in our yearly “Inventory of Environmental and Energy Projects in China.” Once again our inventory is only going to be online for it has become too big to fit in our print publication. I must thank a small patient army of assistants for helping to collect this inventory—a task that demands perfecting the gentle art of heavy persuasion to get entries from the very busy folks in our network. This year **Louise Yeung** and **Juli S. Kim** worked hard to gather the international NGO entries, while **Xixi Chen** and **Yan Baohua** did an amazing job in updating and expanding last year’s inventory of Chinese groups. We must thank **Fu Tao** at *China Development Brief* (CDB), who was also out seeking similar information from Chinese green groups. I am grateful we could share contact information and data to help each other out on this big task. CDB’s directory (in Chinese) is at www.greengo.cn.

Naturally, I am indebted to my diligent authors, who patiently endured my edits and queries. I must single out **Marilyn Beach**, who went beyond the call of duty by reviewing final edits at a very busy moment of her life, waiting for her baby to be born. Perhaps I should really thank her new baby boy for being a bit late! My editing load was lightened this year by my managing editor **Juli S. Kim** and by my former assistant **Timothy Hildebrant**, co-editor of the special report. Naturally, I must applaud **Lianne Hepler** and **Jeremy Swanston** the desktop publishers who created the stunning new CES look. The support of colleagues at the Wilson Center for my work is always that intangible/tangible assistance for which I am always grateful. I also wish to acknowledge funders—new and old—that have helped in this publication by supporting CEF meetings, staff salary, or printing costs: U.S. Agency for International Development, Carnegie Corporation of New York, Michigan State University (using a grant from the National Science Foundation), and the Woodrow Wilson Center’s Federal Conference Funds.

FEATURE ARTICLE

Legal Advocacy in Environmental Public Participation in China: Raising the Stakes and Strengthening Stakeholders

By Allison Moore and Adria Warren

This article describes the political and legal dynamics of the development of public participation in the environmental sphere in China. With reference to recent experiences, particularly China's initial implementation of public hearings on environmental impact assessments, this article examines recent public participation successes and obstacles that may block further development of public participation mechanisms. Successes have included: raising public consciousness and mobilization, creating channels for public feedback to policymakers, involving the public in enforcement, and linking to international resources and legal frameworks. Remaining obstacles to effectiveness include: delays by government in involving the public on project approval decisions; inexperience and imprecise understanding of the government's responsibility and options in responding to public opinion; political and economic pressures on officials and private individuals; and gaps in the legal framework for enforcement of environmental rights. Finally, the article discusses the need and points of entry for addressing such obstacles by increasing the participation of legal advocates in environmental protection through various roles as public interest advocates and technical legal experts in the environmental hearing, legislative drafting, and enforcement process.

A sense of injustice over the sacrifice of environmental and human health in the name of economic development is mobilizing Chinese citizens to voice environmental concerns through both official channels and unauthorized protest. Over the past few years the government, increasingly concerned about the sustainability of China's environment and about responding to social instability caused by environmental harms, has officially embraced public participation (*gongzhong canyu*) as a way to bolster environmental protection—through public hearings, strengthened access to information, and government/private sector collaborations. This experiment with public participation, undertaken in part with assistance from international organizations such as the American Bar Association (ABA), is beginning to accumulate a record of experience that highlights openings for fundamental changes in the political dynamics of environmental protection and local governance.¹

Public participation unlocks a door to new resources in managing China's difficult path forward to develop sustainably and govern more responsibly. It can bring diverse knowledge and expertise

to the table, alert all parties to community concerns and latent environmental problems, enhance public knowledge about and support for development projects, give weight to public values favoring environmental protection, and strengthen civil enforcement of environmental regulations. These resources could prove critically useful as China faces increasingly dire environmental woes. Air and water pollution claim hundreds of thousands of lives annually; the country's ecosystem is irreparably losing ground to economic development projects; and large-scale environmental accidents threaten public health and stability. Moreover, "incidents" of social disorder, many of which are in response to environmental fears, are occurring widely and more frequently throughout the country (Economy, 2004; Orts, 2003; Yardley, 2005). In 2005, public security authorities reported 87,000 public protests, and the Chinese government reported 39,000 cases of "public order disruptions" for the first six months of 2006 (Ni, 2006).² Strengthened public participation mechanisms could provide a legitimate, effective means for citizens to have their voices heard in addressing environmental crises.

Nevertheless, it has become apparent that introducing effective processes will require more than increasing support for public participation in China. There is a disjuncture between legal environmental public participation requirements and their implementation that reflects in part the strong tension between public participation goals and a widespread official concern that participatory processes will open the floodgates to public disorder and conflict among different social factions. A change of orientation towards governance, including greater tolerance for early information disclosure and early public involvement in planning and resolving conflicts, will be needed to translate public participation mechanisms into government accountability from below.

This paper gives an overview of obstacles that continue to limit effective implementation of citizen participation in environmental regulation, and identifies openings for addressing remaining issues. It finds that increasing the role of third-party advocates, including public and private lawyers, nongovernmental organizations (NGOs), and lay advocates, in supporting implementation of public participation can overcome the obstacles and broadly strengthen enforcement of environmental regulations.

With reference to recent case studies of environmental conflicts that highlight obstacles to, and strategies for, effective public participation, this paper argues that the increased confrontation *and* facilitation—all within the formal legal system—that legal advocates bring could offer the most realistic hope for positive change in strengthening China's environmental governance system.

THE LEGAL FRAMEWORK FOR PUBLIC PARTICIPATION IN REGULATING CHINA'S ENVIRONMENT

National environmental regulators, in their attempt to recognize and moderate the environmental impact of China's rapid urbanization and development, have shown an unusual willingness to incorporate civil society into their dialogue and regulatory regime (Alford & Liebman, 2001). This concept, referred to as "public participation," has been officially noted as having its basis in a bundle of different citizen rights that

can be identified as the right to information; right to comment; right to organize; and right to sue for enforcement (Jia, 2005; Xia, 2005).³ Although the Chinese central government has traditionally sought informal, non-binding feedback for proposed policies, this view of public participation as a civil right is new. The ongoing development of the legal framework for environmental public participation reflects this evolving orientation from nonbinding advisory mechanisms to binding obligations grounded in citizen rights.

"Public participation" already implicates a rich set of implementation mechanisms that have started to be introduced in China, including public hearings (*gongzhong tingzheng hui*), intergovernmental coordination meetings (*xietiaohui*), advance briefings (*chufenghui*), surveys (*diaocha*), solicitations of opinion (*zhengqu yijian*), as well as government hotlines and Internet communications. This paper focuses heavily on public hearings as mechanisms with the capacity to strengthen transparency and accountability in environmental governance; however, many comments about the openings and limitations of public hearings apply generally to all of these tools. (See Box 1).

BOX 1. Experiments in Public Hearings

China has been holding legislative public hearings for the last decade, as well as hearings (publicly) on administrative penalties, including environmental penalties. Among these experiments, hearings on setting prices (of train tickets, park admission tickets, and school tuition) are by far the most commonly used; over 200 pricing hearings have been held in China to date (Jia, 2005). Pricing hearings, legislative hearings, and penalty hearings are different in kind and purpose than the types of public hearings beginning to occur on environmental planning and licensing related to EIA. However, the concepts are still so new that Chinese officials often fail to distinguish between public hearings held to assess environmental impact before Environmental Protection Bureau (EPB) approval of construction projects or environmental plans, and these other types of hearings. This can lead to confusion about how much actual experience is being reported by local authorities on holding "public hearings" (Jia, 2005).

Key Public Participation Laws

The key laws in China's current environmental public participation regime are the 2003 Environmental Impact Assessment Law (EIA Law) and the 2004 Administrative License Law (ALL).⁴ These laws require public participation under certain circumstances, and introduce certain disclosure obligations (see Box 2), but generally leave discretion to local authorities to select public hearings from among a variety of other public participation tools, such as

surveys and solicitation of public opinion. There are also broad exceptions to protect "state secrecy." Often, this has translated into non-compliant processes and non-representative citizen participation, as evidenced in several examples discussed herein. In one recent national survey, Chinese citizens across the board described themselves as sorely underrepresented in environmental decision-making.⁵

In an attempt to address some of these gaps, clarify legal obligations, and strengthen

BOX 2. Legal Provisions for Public Participation in Chinese Laws

The legal foundation for public participation in China's environmental regime is contained in the 2003 Environmental Impact Assessment Law (EIA Law), the 2004 Administrative Licensing Law (ALL), and related implementing measures. Select provisions include:

Public participation is required for:

- Construction projects that may have a major environmental impact (EIA Law, Art. 21);
- Certain "special plans" which may possibly cause adverse environmental impact and directly interfere with the environmental rights and interest of the public (EIA Law, Art. 11; EIA Implementing Measures, Art. 33);
- When the license is of direct significance to the interest of the applicant and others and the hearing is requested following a public notice period (ALL, Art. 47); and,
- When license applicants and interested parties request a hearing in cases of significant impact on their interests (ALL Implementing Measures, Art. 5).

Public hearings are permitted:

- When the license is of great importance to public interest and the agency considers it necessary (ALL, Art. 46);
- Whenever environmental agencies desire to hold a hearing for administrative licenses touching upon major environmental protection in the public interest (ALL Implementing Measures, Art. 5);
- In connection with EIAs for construction projects (ALL Implementing Measures, Art. 6);
- In connection with environmental impact reviews of government policy "plans" (ALL Implementing Measures, Art. 7); and,
- Whenever environmental agencies are drafting policies that engender great divisions of public opinion, and for environmental legislation (ALL Implementing Measures, Art. 39).

In each case above, there are exceptions to protect "state secrecy." Public participation obligations are often discharged through surveys or collection of expert opinion.

Information disclosure provisions further enhance public participation rights:

- The developer and the EPB each shall disclose key information concerning the EIA process to the public at relevant points during the EIA report preparation and review process, and provide a mechanism for collecting public opinion (EIA Implementing Measures, Arts. 5 and 7-9); and,
- License applicants and interested parties have the right to "consult the files" (ALL Implementing Measures, Art. 12(8)).¹

compliance, SEPA recently issued implementing measures under both laws. The 2004 “Environmental Protection Administrative Licensing Hearings Provisional Measures” (*huanjing baohu xingzheng xuke tingzheng zanxing banfa*) (hereafter, ALL Implementing Measures) and 2006 Provisional Measures for Public Participation in Environmental Impact Assessment (*gongzhongcanyuhuanjingyingxiang pingjia banfa*) (hereafter, EIA Implementing Measures) delineated and expanded citizens’ participation rights in EIAs for environmental administrative licensing of projects and plans, as well as in construction projects’ preparation and agency evaluation of EIA reports. The EIA Implementing Measures, which were developed through a participatory process that included solicitation of public comment through SEPA’s website, also introduced a new focus on information disclosure in addition to the solicitation of public opinion.⁶ International organizations such as American Bar Association, have been working with SEPA and environmental

protection bureaus (EPBs) on public participation training. (See Box 3).

In certain cases, municipal governments have passed measures that expand on the national-level public participation rights in the environmental sphere. Most notably, Shenyang adopted Measures on Public Participation in Environment (hereafter, Shenyang Measures), that detail public disclosure and public participation requirements, and direct the EPB to assist with discovery in private environmental lawsuits.⁷ SEPA officials reference the Shenyang Measures as the first and best example of local government regulations on implementing comprehensive environmental public participation rights. Several provincial and large municipal level governments have adopted “open government information” initiatives (the most notable being Guangzhou and Shanghai), which have encouraged broader access to government information. In January 2006, there were at least 30 such provisions in place (Horsley, 2006).

BOX 3. American Bar Association’s Environmental Governance Work in China

The American Bar Association (ABA) was invited by China’s State Environmental Protection Administration (SEPA) in 2002 to provide technical and financial support for SEPA’s governance reform efforts, including promoting public participation, increasing environmental NGO capacity, and improving environmental enforcement and dispute resolution through courts. With assistance from SEPA and ABA (as well as other foreign technical assistance providers), local governments have begun to adopt public access regulations, create channels for providing public feedback to policymakers, and raise public consciousness and mobilization.

Although the legal framework continues to develop, implementation remains weak and geographically disparate.⁸ Recent experiments with public hearings that SEPA and some municipal EPBs have carried out illustrate specific implementation deficiencies and obstacles. Recent case studies elucidate these obstacles to implementation. As they indicate, a strengthened role for public participation may help address deficiencies that currently exist in the environmental protection regime.

ENVIRONMENTAL PUBLIC HEARINGS CASE STUDIES

Over the last few years, as the momentum grew for expanded environmental consciousness and legislative reforms favoring greater environmental public participation, China implemented its first public hearings on local environmental licenses and environmental plans. The first national public hearing on environmental impact assessment (EIA) was held

in 2005. This public hearing on the Yuanmingyuan (Old Summer Palace) lake drainage project EIA attracted national attention, and is widely viewed as being the first of its kind in China and a model for future environmental public hearings. Yuanmingyuan was preceded by a noteworthy public hearing the previous year, held by the Beijing Municipal EPB on the approval of an EIA administrative license for construction of a high-voltage power lines project. Although local government agencies in China have held public hearings on other issues prior to these cases, the level of attention and interest in these two hearings is rightly deserved because they were generated by and responded to true civil society movements at the local and national level.

CASE 1: High-Wire Act—The Baiwangjiayuan Public Hearing

In 2002, in order to power the myriad sporting facilities, residential, and commercial developments that have resulted from Beijing's pre-Olympiad building boom, the Beijing Electric Power Company developed a plan to construct a series of high-voltage electric towers running through the northwestern quadrant of Beijing, known as the "*Xi-Shang-Liu*" (also called "9950") project. The project's EIA report, prepared in 2003 by Capital Railway Scientific Research Institute, concluded that the proposed power line route was basically reasonable and feasible, and that the average electromagnetic radiation along the route (220KV) would meet the requirements of the national standard (500KV) and its safe distance requirements (more than 5 meters).⁹ The EIA recommended safety warnings on the electric towers located in residential areas, as well as public education to increase the community's understanding of and support for the project. The report contained a section on "public participation" that reportedly surveyed the opinions of 102 people in Beijing's northwestern quadrant and concluded they favored the project (Licensing Hearing System, 2005).

When construction in residential areas commenced, residents in the affected Baiwangjiayuan community mobilized to question the project's assessment of "safe" environmental impact. Residents sought to block construction and requested, under Chapter 4 of the EIA Law, that the Beijing Municipal EPB hold a public hearing on whether to grant the environmental administrative license. Using foreign environmental health data and international standards, they raised concerns about the Chinese

national standards used to determine what constituted a "safe" distance from the radiation that would be emitted by the lines, particularly with respect to the safety of children in preschools and sick people in hospitals along the route. As an alternative, they advocated burying the high voltage wires underground, a concededly more expensive measure that would significantly reduce radiation exposure.

With community discontent simmering and confrontations with power line construction crews flaring up, SEPA was spurred on 17 June 2004 to quickly issue and put into effect the ALL Implementing Measures. SEPA used the ALL Implementing Measures to compel the Beijing EPB to grant the request for a public hearing in the Baiwangjiayuan case.

On 13 August 2004, the Beijing EPB thus convened China's first administrative licensing EIA public hearing (Zhu, 2004). Vocal community residents, including engineering and environmental experts living in Baiwangjiayuan, were invited to make statements, challenge the EIA report's conclusions, and present their own evidence. Although participation was by invitation only, participants and experts generally agree that the selected speakers were broadly representative and the hearing permitted an open airing of the conflicting views challenging the government's proposed decision (Licensing Hearing System, 2005; China's Environmental Protection, 2005; Environmental Public Interest Litigation, 2005). As one SEPA official has commented, "a rural migrant [such as the one pictured] would never otherwise have the opportunity to express his opinions directly to [Beijing] government officials" (China's Environmental Protection, 2005).



Rural migrant making comments at the high voltage wire hearing.
© Bie Tao

Moreover, the hearing room was open to the interested public as audience—which filled the room to capacity and spilled into an overflow room, where they watched the hearing via television. Outside the Beijing EPB hearing site, community residents organized a large and peaceful crowd, all wearing matching T-shirts under the banner “Resist Radiation Pollution,” to demonstrate their support. Local and national media reported widely on the strikingly well organized community members participating at this hearing. (See photo below).



Community residents protest peacefully outside the Baiwangjiayuan hearing. © Bie Tao

Despite residents’ apparent success in bringing attention to their environmental impact concerns, less than a month following the hearing, the Beijing EPB issued a decision declining to reconsider its earlier approval of the project. As basis for its decision, it relied both on the Beijing People’s Government’s prior general approval of the power construction project, and the national standards for electromagnetic radiation exposure, without addressing directly the hearing’s evidence of problems with these sources (China’s Environmental Protection, 2005; Environmental Public Interest Litigation, 2005). Community residents appealed the Beijing EPB decision to SEPA, arguing among other things that the EPB had failed to make its decision according to the hearing record or to issue an explanation of its decision to accept or reject the main views presented in the public hearing, as required by Art. 48 of the ALL and Art. 30 of the ALL Implementing Measures. In April 2005, SEPA issued a decision

rejecting their arguments and affirming the Beijing EPB decision (SEPA Decision No. 21, 2005).

The consensus of Chinese experts is that the Baiwangjiayuan public hearing simply happened too late in the process for the proposed alternative of burying the lines to be adopted. Approximately three-quarters of the project’s towers had already been constructed by the time the hearing was held (Licensing Hearing System, 2005). Despite theoretical agreement that the EPB should consider the environmental impact and alternatives of a project based on conditions *before* the project began, it was practically impossible for the EPB not to consider the Beijing Power Company’s sunk costs in the already-constructed towers. As a result, although the public hearing provided an outlet by which the affected communities could express their views, the community continues to await a substantive response to their concerns.¹⁰

In addition to administrative appeals, community residents also sought to appeal the Beijing EPB’s decision to the Beijing Haidian District People’s Court.¹¹ The court held a hearing on the case on 3 December 2005, and plaintiffs presented their arguments that the Beijing EPB failed to base its decision on appropriate evidence and law. While awaiting this hearing, residents had sought to obtain a court order staying construction until the litigation was resolved. After issuing a temporary initial stay in December 2004, in January 2005 the court determined that a stay was unnecessary because continued construction was necessitated by important public interests and would not affect the outcome of the case (Haidian People’s Court, 2005). Although approximately 20 to 30 members of the interested public turned out to observe the court hearing on the merits in December 2005, knowledgeable observers comment that the delay and disappointment to date since the Baiwangjiayuan public hearing have caused many community residents to lose confidence in the legal process (Expert B, 2006).

CASE 2: Addressing the Drought of Experience—Yuanmingyuan Public Hearing

Building on the Beijing EPB’s experience in holding the Baiwangjiayuan hearing, less than a year later, SEPA held China’s first national-level public hearing on the environmental impact of a proposed government action. As with Baiwangjiayuan, the Yuanmingyuan public hearing was generated by civil

society pressures, started by a Lanzhou University professor who visited the Old Summer Palace Park in March 2005. He observed that park officials were engaged in a massive construction project to line the Old Summer Palace's famous lakes with plastic and cement in order to prevent drainage.

Water shortages in Beijing have meant the lakes at this major tourist site are dry nine months a year. To protect the Old Summer Palace lake scenery, various Beijing and national government authorities had apparently prepared and approved the anti-drainage project.¹² Outraged at the serious permanent ecological damage threatened by the project, the professor exposed the construction on a website and sparked widespread national attention and public concern.¹³

The quickly escalating public outcry prompted the Beijing Municipal EPB and Haidian District EPB to investigate, whereupon they concluded that the project was being carried out without regard for EIA procedures and approvals. The park administration defended itself with the surprising argument that projects like this one, for the purpose of protecting the park's lake environment, are not the type of projects that "impact" (meaning, apparently, *incidentally* impact) the environment under the law ("Old Summer Palace," 2005). Nevertheless, on 31 March 2005, SEPA ordered the developers to immediately cease construction on the Old Summer Palace project and undertake the missing EIA application and approval procedures.

On 7 April 2005, SEPA announced that it would convene a public hearing on the matter and invited interested members of the public to apply to participate in the hearing (SEPA Announcement No. 13, 2005). Although the timing was extremely compressed, more than 200 people applied to participate by the deadline four days later, and SEPA announced the names and work units of the 73 chosen "public hearing representatives." These included Old Summer Palace officials, Beijing government officials, scholars (including the Lanzhou professor who catalyzed the issue), students, business representatives, engineers, other professionals, and NGOs (SEPA Circular No. 117, 2005). On April 13, these representatives gathered for the public hearing at SEPA headquarters to consider whether: (1) the project failed to protect the local ecology, (2) the expert opinion on which the project plan relied was based on true science, and (3) the construction that had already begun should be demolished and removed.

The Yuanmingyuan hearing is widely perceived in China as a model example of implementation of the public hearing process. As in the Baiwangjiayuan case, a cross-section of the interested public was invited to participate in the hearing, and participants vigorously presented opposing viewpoints. They directly and publicly contested the position and evidence offered by government officials in the park administration.¹⁴ Unlike the Baiwangjiayuan case, the Yuanmingyuan hearing was broadcast nationally on central television and widely covered in the news media, providing a huge civic legal education benefit. As SEPA Vice Minister Pan Yue summed up:

Regarding the result of the Yuanmingyuan construction public hearing, I think a democratic process is the most important goal. The whole process of this public hearing, including the sign-up, the hearing itself, the EIA report, [and] the implementation of the administrative result all were made public through the Internet and media, and one can say this is our most thorough public participation attempt to date (Xia, 2005).

Importantly, NGO representatives from prominent national environmental groups such as Friends of Nature and Global Village Beijing played a leading role in planning and presenting the case in the "public interest." By contrast, no NGOs were officially represented in the Baiwangjiayuan hearing; rather, civil society was represented by *ad hoc* committees of concerned residents who had organized around the single issue of the power lines. In part due to national NGO participation, the Yuanmingyuan hearing involved greater attention to the public's procedural participation rights and implementation through hearing rules, as well as greater national publicity, more expert participation, and increased attention to the report's conclusions.

Following the hearing, SEPA gave the park administration 40 days to submit an EIA report. Initially, the publicity and political sensitivity of the case reportedly scared off all of the potential environmental assessors from being the lead work group on the report, delaying the starting of the evaluation and report for more than a month after the hearing, until Tsinghua University Environmental Impact Assessment Office finally agreed to undertake the task ("High Degree of Difficulty," 2005; "SEPA Vice Minister Criticizes EIA," 2005). Tsinghua

organized several other prominent Beijing universities to join the assessment, and submitted the EIA report by the last week of June. Although critics noted that the allotted timeframe for conducting the assessment was far too short for a project of this complexity and importance, they generally praised the report for its breadth of scope and depth of analysis. In another first, SEPA made the EIA report publicly available on its website.¹⁵

The report's detailed analysis addressed the ecological concerns raised in the hearing, and concluded that the park's plan lacked reasonable scientific basis and failed to consider alternatives, and that the lake lining had already seriously damaged the park's ecology. The report thus recommended the project's remaining plan be completely altered. Rather than lining the lake bottoms with plastic and concrete composites, it described alternative measures involving both increased water conservation and water reclamation within the park, and more environmentally friendly methods of preventing drainage by lining the lake bottoms with natural materials (Yuanmingyuan EIA Report, 2005). On 7 July 2005, SEPA approved the EIA report.

Although the Yuanmingyuan hearing appears to be groundbreaking for China, there was a major shortfall that ultimately weakened the process. Legal experts have pointed out that SEPA voluntarily convened its public hearing during the stage prior to the EIA report, when public hearings are not in fact mandated; it then failed to convene a public hearing after the EIA report had been submitted, while the agency was considering the report's approval, when a public hearing *is* mandated by the EIA Law and Implementing Measures (China's Environmental Protection, 2005; Environmental Public Interest Litigation, 2005).

The final EIA report contained important assumptions and limitations that would have warranted public input. Significantly, the assessment explicitly limited its evaluation and recommendations to the narrow question of analyzing the impact of the relatively small part of the project remaining to be constructed, taking the existing investment and its environmental impact as given (Yuanmingyuan EIA Report, 2005). By the time SEPA halted the project and held the hearing, the project was already approximately 90 percent completed, at a cost of 37 million Yuan (over \$4.6 million) (Yuanmingyuan EIA Report, 2005). SEPA's approval, sticking closely to the report's conclusions, left the existing construction mostly intact, ordering only a part of it

to be dismantled ("SEPA Demands," 2005; "SEPA Says Old Summer Palace," 2005). In what was evidently a political decision, SEPA thereby rejected arguments by experts and the public to dismantle the entire project, with the park administration liable for the ecological losses and restoration costs caused by its unlawful action.¹⁶

Also, despite clear evidence of the park authorities' fault in failing to conduct an EIA on the project and the EIA report's evidence of the resulting serious ecological impact of their actions, to date, no park officials have been sanctioned for this failure, nor has the agency been ordered to otherwise pay for the damage.

Even with these limitations, however, the Yuanmingyuan hearing—and the related public attention and feedback—was successful in sparking some modifications to the remaining project. More importantly, perhaps, the case demonstrates that direct conflict between public opinion and government decision-makers can be aired in an orderly way through a public hearing, without threatening the stability of social order. By potentially assuaging fears of government officials about public participation in the EIA process, Yuanmingyuan thus deserves praise as China's first successful public hearing on environmental impact of a controversial and high visibility construction project.

OBSTACLES: LIMITATIONS ON THE IMPLEMENTATION OF MEANINGFUL PUBLIC PARTICIPATION

In over two years since the regulatory regime for public participation in environmental decision-making was established, Baiwangjiayuan and Yuanmingyuan stand out as China's primary examples of its implementation.¹⁷ Officials outside Beijing, as a rule, have not yet emulated these examples, and are not yet providing regular channels for the public to provide input to, or to raise concerns and challenges with regulatory policymaking such as EIAs.

Why has public participation developed in such a halting and ineffective way in China? At a fundamental level, local and provincial environmental authorities have exhibited different levels of tolerance for opening up environmental decision-making to allow greater public participation. As one participant at a SEPA/ABA training session put it, when the EIA Law first appeared, it was believed that, "public participation would cause confusion and chaos and only when everything

was completely controlled by the government can a burst of energy be formed.” (ABA Report, 2005). There is a common anxiety that runs deeper than the mere concern over how to hold an orderly hearing. It goes to the underlying concern with finding “harmonious” solutions to public conflicts between government and citizens and between different factions of the citizenry. SEPA itself has identified some of the challenges that have resulted from this tension, noting:

[A]s two years of experience implementing the EIA Law demonstrates, there still exist some problems in China’s public participation in EIA, concentrated on issues that information is not being fully and timely disclosed; the scope of public participation is not comprehensive; the representativeness of the people being targeted is not strong; and there is a lack of necessary information feedback [provided to the government] (SEPA Solicitation of Public Comment, 2005).

The Baiwangjiayuan and Yuanmingyuan public hearings and other recent public participation experiences suggest that these are not the only challenges in translating public participation from concept into reality.

Loopholes in the EIA legislative framework

The fact that both the required EIA reports and the public hearings over the Baiwangjiayuan and Yuanmingyuan developments occurred well into the construction process was *de facto* sanctioned by a loophole within the EIA regulatory regime. Article 31 of the EIA Law explicitly permits construction projects and government to “make up” (*bubao*) a missing EIA report after the construction project has started, essentially without penalty for the consequences of the delay. Crucially, there is no counterpart requirement that the environmental impact of a project be evaluated as of a date prior to construction, when the public participation process should originally have been implemented. Nor does the law specifically provide that the responsible agency or enterprise must assume liability for environmental damage imposed because of failure to conduct the EIA in advance.

The so-called “Environmental Impact Assessment Tempest” (*huanping fengbao*) of 2005 is another telling example of this and other legislative loopholes. In what was seen as a bold political

move by SEPA, in early 2005, the agency temporarily halted construction on 30 high profile, large-scale, construction projects, including the Three Gorges Dam (Chuan, 2005; “Halt of Projects,” 2005). SEPA’s order pointed out that these projects (most of which were being constructed by state-owned enterprises) were all unlawfully approved by relevant government departments because they had started construction either without having an EIA or without obtaining the environmental protection administrative authority’s approval of the EIA.¹⁸ The State Council ultimately intervened to “coordinate a solution” (*xietiao*), and settled the matter by permitting the projects to make up their EIA requirements and restart construction, apparently without consequence or penalty (Environmental Public Interest Litigation, 2005). As one Chinese commentator noted, “[if] you can just start projects without EIA and then make it up later, the point of EIA itself is not accomplished, which is to have consideration of environmental impact in advance” (Environmental Public Interest Litigation, 2005).

A lack of defined standards can also create loopholes under which officials, developers, and work units can argue they have complied with EIA Law without implementing governance practices. For example, current law fails to provide standards for appropriate representativeness and informed comment. As in the Baiwangjiayuan case, developers often discharge their EIA obligations through surveys, and no standards exist for ensuring a representative sample. In one other exemplary case from 2004, after 200,000 residents of the southern city of Shenzhen organized strong opposition to a throughway being built to Hong Kong, it was discovered that EIA requirements had been satisfied by surveying 50 people on the eastern side of the city—even though residents on the western side of the city would suffer the greatest impact (Environmental Public Interest Litigation, 2005). Such cases illustrate why in practice the “public participation” section of most EIA reports in China, under which public opinion is supposedly collected and summarized, invariably concludes that the public has no significant concerns that are not addressed by the project. The 2006 EIA Implementing Measures (which do not contain any specific penalty or enforcement provisions) try to produce more representative samplings, by setting out what procedures should be followed through respective public participation mechanisms (Art. 15).

Weak Institutional and Judicial Enforcement Mechanisms

The failures to apply environmental impact modifications to the entire projects in Yuanmingyuan and Baiwangjiayuan illustrate the institutional weaknesses of environmental protection authorities in China. Seeking a broader outcome that incorporates appropriate incentives for early compliance, but that may be more costly and thereby more punitive for developers and local government, ultimately requires political tradeoffs that environmental authorities may not have the clout or resources to make or enforce. Implementation and enforcement of the EIA Law and its public participation requirements are weakened by overlapping and confusing jurisdiction and by severe institutional and financial deficiencies, of both regulatory and judicial entities, as well as underdeveloped civil enforcement mechanisms.

/// To date, courts have been reluctant to exercise their authority to enforce mandatory environmental public participation or information disclosure requirements.

In addition to SEPA, provincial, municipal, county and township level EPBs are tasked with implementing environmental laws and regulations. Even as public observers celebrated the EIA Tempest, other Chinese legal analysts privately shared with the authors the observation that SEPA in fact may have lacked legal authority for halting construction on some of the targeted sites. That is, regulatory power over requiring EIA on some of the more local projects might arguably have fallen only within the purview of local or provincial EPBs, or even only of local or provincial people's governments, depending on the type of project involved. This may be one reason for the State Council's involvement in resolving big cases such as the "EIA Tempest" and the Songhua River accident. The State Council is reportedly committed to drafting EIA implementing measures that will extend

detailed EIA public participation requirements to all relevant agencies, following the February 2006 issuance of a Decision on Fulfilling Scientific Development and Strengthening Environmental Protection. It remains to be seen whether this anticipated regulatory guidance will resolve these interagency and intergovernmental coordination problems that still leave gaps in the framework.

As many commentators have observed, SEPA and EPB governance is also generally hampered by insufficient resources, understaffing, lack of training, political pressures favoring local development, conflicts of interest, and corruption (Economy, 2004, 2005; Ferris & Zhang, 2005; Tang, Tang, & Lo, 2005). These same issues affect political will to invite public participation in environmental governance. Under the ALL, relevant government authorities (not the project applicant or hearing applicant) are responsible for all costs incurred in carrying out public participation (Art. 47). Compounding the problem, the central government does not allocate any funding to support such efforts.

Legal advocates are left with limited recourse for enforcement or redress in the event environmental rights are breached. To date, courts have been reluctant to exercise their authority to enforce mandatory environmental public participation or information disclosure requirements. Although the EIA Law, the ALL, and the related implementing measures are silent as to matters of private enforcement, these requirements are in theory enforceable through the general right to seek higher government administrative review of lower government decisions (*fuyi*) and, if not satisfied, then to bring administrative lawsuit in court (*susong*), that is available under the organic Environmental Protection Law (1989), the Administrative Litigation Law (1989), and the Administrative Review Law (1996).¹⁹ Nevertheless, the effectiveness of such civil recourse is limited by well-known political and capacity problems with judicial enforcement of the law, such as insufficient judicial independence, undue local influence over the courts, and insufficient training (Alford & Shen, 1997; Kahn, 2005). To the authors' knowledge, no Chinese court has yet to accept a case and issue a judicial decision to mandate government compliance with public participation or information disclosure rights.

Compounding the situation of weak government implementation and enforcement authority, China has limited the avenues through which NGOs, the bar, or private citizens can seek to share SEPA's

burden by pursuing civil enforcement of policy decisions. NGOs in particular face onerous and arbitrary licensing restrictions, and environmental advocacy NGOs across China are closely scrutinized (Yardley, 2005; CECC, 2005; US Embassy, 2003; Ma, 2005). In 2005, Chinese governmental NGOs were required to join and pay dues to a new quasi-governmental umbrella organization, the All-China Environment Federation (ACEF). Although officials assert that the ACEF will ensure better coordination and encourage NGO/governmental communication, it has the capacity to regulate, and potentially co-opt, civil society groups (CEEC, 2005).

Legal advocates, too, have been increasingly scrutinized and penalized for trying to assume roles in legal disputes (Cohen, 2005). In May 2006, the All China Lawyers Association (ACLA) issued a controversial Guiding Opinion for lawyers participating in sensitive cases involving “mass litigation.”²⁰ The opinion, specifically applicable to environmental cases with ten or more plaintiffs, instructs lawyers to: (1) obtain approval from at least three partners in the law firm before taking on such a case; (2) “promptly and fully communicate” their taking on the case to the local justice bureau and local bar association; (3) accept the “supervision and guidance” of local justice authorities and bar associations in handling the case; and (4) refrain from advising clients submitting petitions (through the *shangfang* system of petitioning legislative representatives, separate from complaints in the court case) to the government regarding the case (Guiding Opinion, 2006). While some lawyers defend the ACLA opinion on the grounds that it is intended to provide greater political and professional support for lawyers handling these difficult cases, many others have publicly objected to the opinion’s control and potential chilling of lawyer involvement in environmental and other important public interest litigation.²¹

The problems and limitations in administrative and civil enforcement authority may explain in part China’s resort to draconian punitive measures in egregious environmental disasters. The prosecutions following the accidental large-scale ammonium nitrate spill by a Chuanda Conglomerate factory in the Tuojiang River in Sichuan in February 2004 are typical examples. This spill killed huge numbers of fish, caused a month-long water suspension emergency in Jianyang city, and created lasting ecological problems. The primary enforcement response was imposition of very large administrative fines and compulsory compensation, as well

as the convictions in criminal trials of three high company officials, the Qingbaijiang District EPB Vice Director, the District environmental monitoring station head, and the District environmental management office head.²² Criminal prosecutions are generally expected in most high-profile environmental accidents, including the most recent Songhua River toxic spill in November 2005.

While the possibility of severe punitive sanctions should in theory deter violations, this approach underscores the lack of consistent monitoring and enforcement standards, on a routine level, that could be more successful in preventing such extreme environmental disasters from occurring. As others have noted, localities have generally not established appropriate routine incentives for compliance (for example, fines are set too low to effectively encourage compliance) (Economy, 2005). Although “environmental prizes” in the form of public recognition and small cash awards are springing up, these are still far from constituting a comprehensive system of positive incentives under which local officials might expect commendation for preempting such egregious outcomes.

Moreover, while the possibility of severe punitive sanctions should in theory deter violations, they can also, ironically, deter officials from disclosing pollution, as they fear personal liability (Economy, 2005). Possibly fearing such retribution, local officials in Jilin initially withheld information about the Songhua River toxic spill from environmental agencies, government officials in the downriver province of Heilongjiang and Beijing, and the public (Pan, 2005).

Insufficient Responsiveness and Accountability to the Public

The Baiwangjiayuan and Yuanmingyuan hearings provided concerned citizens with public opportunities to present and discuss their environmental concerns with government officials, but in neither case did members of the affected community receive a complete substantive response to issues they had raised. Yuanmingyuan’s detailed EIA report in fact honored the public’s ecological concerns in the breach—Chinese environmental law experts note that it is rare for EIA reports to respond even as completely as in Yuanmingyuan (ACLA Workshop Materials, 2005).

Although applicable Chinese law calls for environmental authorities to make EIA decisions

“according to the hearing record” and to “attach in the license decision an explanation of the acceptance or not of the main viewpoints made known in the hearing” (ALL Art 48; ALL Implementing Measures Art 30; EIA Implementing Measures, Art. 34), the standard under which the government should accept or reject the public’s concerns and suggestions is undefined (the problem is magnified, by the lack of precedent and training that is available in China). Under the recent EIA Implementing Measures, regulators shall announce the results of their examination and approval of an EIA review (Art. 13), and the public can report to the agency if it finds the public opinion has not been sufficiently reported or considered (Art. 18).

Anecdotal evidence from ABA training sessions involving mock public hearings generally suggests that modern decision-makers in China are more comfortable providing a general justification of their overall decision rather than a detailed examination of their acceptance or rejection of the individual main arguments and evidence put forward. This too easily allows decision-makers to dodge the necessary implications of certain arguments and thereby avoid full accountability for their ultimate decision. Similarly, in Baiwangjiayuan and Yuanmingyuan, the Beijing EPB and SEPA relied on the standards or decisions of other government authorities to sanction approval of the projects, and thereby avoided confronting the public’s specific challenges and concerns.

Instilling a greater sense of responsibility for public explanation would of course require more than stronger legal mandates—it would call for Chinese government officials to change their understanding of and approach to public interaction. Rhetoric from SEPA officials suggests that the goal is to, “make the relevant departments truly adopt the public’s opinion in the decision-making process” (Xia, 2005). SEPA and central government officials are quite conscious of how significant an undertaking this is. It would require moving from an orientation of “leading” the public to an orientation of “serving” the public; from an understanding that the public has a “duty to participate” to an understanding that the public has a “right to participate” (Xia, 2005).

The Baiwangjiayuan case study indicates that implementation of new public participation requirements is often incomplete because local officials interpret it within a rigid paradigm of governance. In Baiwangjiayuan, the final EIA report specifically directed that the power company engage in

public education for the purpose of avoiding community conflict and increasing the community’s understanding of and support for the project. This indicates an emphasis on the government’s opportunity to impact the public’s opinion—to disregard the way the public’s concerns should impact the government. One provincial EPB leader who had received exposure to more accountable public hearing mechanisms reported, “[p]reviously, government officials thought mostly about instilling the provisions of law and policies into people’s mind[s]” (Expert A, 2005).

Even if officials are able to reorient themselves towards greater accountability and responsiveness to public opinion, the legal framework still needs to clarify precisely in what way public opinion should influence decisions. Presumably the purpose of a public hearing is not just for the government to reflexively “do what the public wants,” but rather, through eliciting information from the public about its concerns and proposed alternatives, make a decision based on evidence and reasoning related to those concerns and alternatives. While interpretations of the applicable laws have progressively sought to provide greater clarity (with the EIA Implementing Measures providing that developers shall “carefully consider public opinions, and attach in the environmental impact report a description as to whether or not to adopt their opinions,” subject to EPB’s possible examination and judgment on the reasonableness of this decision (Art. 17)), neither the law nor the rhetoric on this crucial point are clear. Greater explicitness and sophistication in explaining expectations for responding to public opinion and understanding how to incorporate it in decision-making would help strengthen accountability of both developers and regulators.

Rigid Environmental Information Control

Among the greatest successes of the Yuanmingyuan and Baiwangjiayuan cases is that the public movement successfully yielded valuable environmental impact information. Although Article 4 of the EIA Law requires EIA reports to be made public (*bixu gongkai*), and the EIA Implementing Measures require a more systematic and accessible disclosure process (Arts. 8-11), the provision is not self-enforcing in practice. Environmental authorities, including SEPA, still fail to make EIA reports publicly available as a general practice, even when explicitly demanded. Especially where environmental impact is significant and controversial.

In one case, national and local environmental NGOs spent two years pressing the Yunnan provincial government to make public its EIA report on a huge hydroelectric dam construction project on the Nu River (Nujiang), for the planned cascade of 13 dams presents potentially serious geological, biodiversity, cultural diversity, and other impacts that the Chinese environmentalists believed warranted public examination. In August 2005, the Chinese NGOs Green Earth Volunteers and Friends of Nature organized an open letter signed by hundreds of individuals primarily representing Chinese civil society and NGOs. Only after the letter was published did the provincial EPB finally release the government's order approving the EIA report (Yardley, 2005; Environmental Public Interest Litigation, 2005), however the report itself has reportedly been deemed a state secret.

In the case of the Shenzhen/Hong Kong thoroughway discussed above, despite the large-scale protests, the Guangdong EPB has not made public any information about the thoroughway's potential environmental impact on Shenzhen residents. In stark contrast, *all* the information materials on the impact of the Hong Kong end of the tunnel have been made publicly available by the Hong Kong government on the Internet.²³

Finally, where NGOs, lawyers, and other representatives of civil society undertake to fill the gap by disclosing environmental impact information themselves, they are often subject to retaliation. Examples of media blackouts, or personal scrutiny, harassment, or arrests are not uncommon (Yardley, 2005; CECC 2005; Cohen, 2005). In the dam-building case on the Nujiang, Chinese environmental NGOs have taken up further calls for a public hearing to confront the EIA reports' basis and raise alternative concerns. These efforts have to date produced no response except for, according to private conversations with the authors, a ban on further media publicity of dam building on the Nujiang. In an unwelcome recent development, in June 2006 it was reported that the Standing Committee of the National People's Congress, is considering legislating fines for media that publish information about a sudden event "without authorization" (Kahn, 2006).²⁴

With many civil society mechanisms foreclosed, the main cause for hope for information disclosure to become more institutionalized comes from government authorities themselves. The Shenyang Measures (Art. 10) specifically

make broad categories of environmental information "public" information and specify the public's right to information in specific categories—such specificity is essential to actual implementation of such rights. It appears that the public is taking advantage of its rights to request this information—the Shenyang EPB reported a thousand separate requests for information in the first six months of operation as internal rules.²⁵ In private conversations with the authors, government officials have cited the Shenyang Measures as showing the need for increasingly specific requirements for disclosure (with time limits attached and specific categories of information elaborated) to enforce disclosure obligations.

The recent EIA Implementing Measures provide promise for more systematic disclosures

BOX 4. Zhejiang Hotel Association Environmental Boycott

In an example of using information to create economic pressures for change, in 2004 the Zhejiang Hotel Association organized what is arguably China's first civil society boycott of a company's products on the basis of the company's detrimental environmental practices. The boycott was based on a research report conducted by Greenpeace-China that provided substantial evidence about how APP, which had supplied paper products purchased by Zhejiang member hotels, was illegally logging in southwest China. But the hotel association faced prompt retaliation for its "green purchasing appeal," with APP suing for defamation (*APP Jinguang v. Zhejiang Hotel Association*). Although APP quietly dropped the lawsuit a few months later in favor of its own media public relations campaign emphasizing its environmental friendliness, the underlying land use issues and their irremediable impact on the region's biodiversity have not yet been addressed. Chinese legal scholars note that it is a shame the case did not reach a decision, because it might have set a good example for upholding the rights of civil society groups in China to organize an environmental boycott.

during the EIA process. Nevertheless, where political will exists for “open government,” such as evidenced in Guangzhou and Shanghai municipal “right-to-know” regulations applying to government information generally, the overall presumption of a right to open information may be sufficient. (See Box 4). The most important factor in the long run may be the general attitudinal shift in China (possibly spurred by experience with public health-related emergencies such as SARS and the Songhua River spill) towards the idea that the public really does have an immediate right to know.

Lack of Overall By-in by Local Government

It is not coincidental that both Yuanmingyuan and Baiwangjiayuan took place in Beijing. SEPA and ABA conducted a survey of local EPB concerns in early 2005 and found that, in striking contrast with EPBs in more urban and economically developed areas, EPBs in rural areas, such as Inner Mongolia, Xinjiang, and Ningxia, believe that they lack scientific technical capacity to measure environmental impact and formulate environmental protection policy. Through the survey and in subsequent interviews with the authors, local level officials declared that governance issues were, for them, secondary to more “fundamental” problems of doing environmental protection work.

Environmental officials in comparatively wealthier provinces such as Hebei also express doubt that public participation will be helpful to furthering environmental enforcement policy and practices or will justify the procedural burden it imposes. One participant at an ABA-sponsored training event summed up this sentiment: “If the EPB finally approves the project [that is opposed by the public], then what is the point of the public hearing?” (See also Si Yu, 2005). This problem is sometimes referred to as, “hearing held, final decision approved” (*fengtingbiguo*). These local government concerns are mirrored by a general consensus that citizens’ participation will not be taken seriously. SEPA officials like Pan Yue cite the lack of public confidence in the government as a key impediment to the successful implementation of the entire public participation experiment (Xia, 2005).

One of the most straightforward practical solutions to this problem of government and citizen discomfort with public participation would be to implement such processes *before* the decision is a foregone conclusion and to fully consider public

input. The very possibility that the outcome—even the questions and concerns—would be undefined in advance might seem untenably risky to government officials accustomed to (or attempting to) maintain social control. In interviews with the authors, officials who have participated in the ABA public participation training program and follow-on activities over the last few years have reflected that their own starting point was that the government is the best environmental protection policymaker and implementer; only with experience and greater consciousness did they report coming to see how civil society can supplement government’s efforts to protect the environment. As one official put it, “[w]ith nearly two years of experience after the training, the EPB increasingly understands that they must include the public to participate in their work in order to better protect the environment. This cannot be done by a few people or a few agencies” (Expert A, 2005). In the end, the experiment in public participation will require leaps of faith by both the public and the government.

Lack of Legal Expertise on the Part of the Government and Public

Finally, failures in implementation of public participation to date rest in part on a lack of legal expertise and experience with public participation among government organs, construction and environmental impact assessment units, and the public. Chinese government, NGOs, and multilateral assistance providers are working to try and address these needs (Xia, 2005; Si Yu, 2005; Zusman & Turner, 2005).²⁶ The authors’ experience has consistently shown that local trainings are the first systematic exposure that most local EPB officials and other environmental stakeholders have to the basic legal framework of environmental protection and public participation in theory and practice. One highly promising way to address this lack of legal expertise would be to increase the role of lawyers in policy development, training or counseling of stakeholders, as well as facilitating dispute resolution and public hearing processes.

OPENINGS: LEGAL ADVOCATES’ ROLE IN THE WAY FORWARD

In the environmental public participation movement in China to date, legal advocates—such as public and private sector attorneys, NGOs, prosecutors and other governmental advocates, and legal

aid centers—have played only a minor role. A small but growing number of NGOs and lawyers provide legal representation in environmental cases, primarily in environmental compensation litigation, and still others have organized to bring public pressure on development projects, using law as a tool. The Center for Legal Assistance to Pollution Victims (CLAPV) and Green Earth Volunteers are notable examples. While the importance of the roles assumed by such organizations is not to be underemphasized, there has been little attention to the other many varied roles that legal advocates can play to raise stakeholder legal consciousness and rights awareness, enforce public participation rights, and organize more orderly and effective public participation. Some of these roles are outlined below.

Legal advocates can provide much needed training, technical support and guidance for all environmental stakeholders. In drafting legislation and regulatory measures, the national government has commonly taken advantage of legal expertise within the bar, relying in particular on ACLA and prominent environmental law scholars; but local governments outside of Beijing need greater access to such professional legal expertise. Legal advocates can address the variety of practical legal questions that arise in implementing public participation at the project level, through trainings offered to both public and private sectors and in institutional roles as in-house legal counsel for government, enterprise, and NGOs. Some groups are beginning to find this niche. For example, the Wuhan “Green Stars” NGO provides technical legal and scientific advice to private enterprises on compliance with “green products” and pollution regulations. In Jinan, the former director of the Shandong EPB training center is seeking to establish a group to provide environmental law advising services to EPB officials, NGOs, and interested community groups. Regional EPBs could further refine this idea by creating a “public adviser” office within their agencies, in order to provide specific expertise on outreach, planning, and implementation of rules for public hearings and other public participation in environmental decision-making.

Legal advocates can strengthen official channels for raising concerns and resolving disputes, and help the public to voice them in an effective way. Legal advocates can organize the issues, frame them in a way that is capable of legal resolution, and direct

them into proper judicial or administrative channels.²⁷ This role is not limited to public hearings or enforcement litigation. In Wuhan, the EPB has experimented with linking legal advisors with the government and the interested public through a radio call-in show and related website Q&A platform focused on environmental legal advice.²⁸ Since the program’s launch in July 2005, hundreds of audience members have expressed their interest and support for the show, and in at least two instances the audience’s participation revealed actionable legal complaints. In one, the project’s legal advisors decided to represent the caller in filing a formal petition for government attention.

Legal advocates can assume a “watchdog” role. A carrot and stick approach—with lawyers providing the enforcement “stick”—might be needed to compel local EPBs to enforce national environmental policies. As one American environmental lawyer and activist noted in conversations with the authors, U.S. environmental government authorities, too, treated public participation laws as voluntary until lawyers took cases to court to enforce the public’s participation rights. In such cases, the experience of going through the required steps, even under duress, can cause disclosure of valuable information and educate the public about its legal rights.

There are, however, some positive signs that environmental public interest litigation of this sort may be developing in China. ACLA’s environmental committee and others are promoting legislative changes that would explicitly sanction and promote the role of NGOs and other organizations in suing to compel administrative action in the public interest. Interestingly, China’s Procuratorate—the public prosecutor’s office—also recently expressed interest in engaging in environmental public interest litigation.²⁹ Such efforts by public and private “attorneys general” would bring additional technical expertise (and, in the case of the Procuratorate in particular, powerful investigative authority) into the enforcement process; transfer costs from individuals to NGOs and government institutions better positioned to represent the public interest as a whole; and alleviate the need for SEPA to significantly increase its resources in order to more effectively serve as the sole environmental “watchdog.”

Legal advocates can encourage and facilitate information sharing. The Shenyang Measures, SEPA’s EIA Implementing Measures, and other isolated

local government agreements such as a Guangdong EPB memorandum of understanding with local law firms, all exhort environmental government authorities to provide environmental information to involved parties (*libai guanxi ren*) in environmental cases. In Yuanmingyuan, public advocacy led to the publication of the EIA report on the SEPA website—the first time that many environmental NGOs or the general public in China had ever read an EIA report. Following this successful example, the NGO community demanded public disclosure of EIA reports under applicable law in the Nujiang case discussed above and others. Legal advocates can help the public and NGOs know what they have the right to ask for and make the demands through proper channels.

Legal advocates can promote a culture of respect for citizens as rights-holders. Finally, the participation of legal advocates can help create a political and legal culture of respect for citizens as rights-holders entitled to government responsiveness and accountability. The authors' experience in implementing mock EIA public hearings in ABA training sessions for government officials and local stakeholders confirms that the lawyers who participate in these mock hearing exercises do in fact take a leadership role in organizing the groups' arguments and in relating the public demands to the legal issues that are within the government agency's authority. Lawyers' participation offers access to justice as well as to power, gives a voice to disadvantaged groups, and compels argument for the issues at stake.

In part, the under-involvement of legal advocates in China in supporting good governance practices is due to the relative newness of the environmental bar and environmental law as a specialty. The ACLA Environmental Law and Natural Resources Committee was formed only in 2000 (although its capacity has rapidly increased). At the same time, one of the ACLA committee's founders and its Chair, Peking University Law Professor Wang Jin, as well as Professor Wang Canfa of China University of Politics and Law and Director of CLAPV, each started large-scale training programs for judges and lawyers on environmental law. Prior to this time, there was essentially no professional training available for environmental lawyers and judges in China, and few opportunities to study environmental law. Today, in addition to increased training opportunities, China's new environmental bar is leading a reform movement for "public interest litigation," bringing a variety of pollution compensation suits, administrative

litigation challenges, and other cases testing the boundaries of the judicial system to enforce protection for the environment under law.³⁰

Legal advocates will have an uphill battle before their participation is not simply viewed as "troublemaking." For many officials in China, involving lawyers in organizing public legal demands will raise the stakes and heighten anxiety over public disorder (*luan*) and social conflict. The recent ACLA Guiding Opinion on lawyer involvement in mass cases, discussed above, is a case in point.

Yet in some regards, these same anxieties over public discontent and its impact on societal harmony and social order, which contribute to the lack of political will and buy-in for participatory processes generally, can also provide a way forward. Ordered public hearings, training, counsel and guidance, and encouraged use of proper legal channels—that is, formalizing and institutionalizing the role of advocates—have the possibility of not only channeling discontent into orderly forums, but also of forging publicly acceptable resolutions. Indeed, various pilot projects in China show that participation of legal advocates does not always sharpen disputes. Chinese legal professionals might sometimes choose a "teacher/arbitrator" rather than a "partisan advocate" approach. Relying on their legal expertise, they explain to both sides what the law requires, towards the goal of leading both sides to agree to abide by the solution proposed by the lawyers.

CONCLUSION

In interviews with the authors and in training for local government officials and other stakeholders, SEPA and NPC officials express that the larger goals of the public hearing system should be to: (1) improve the Party's democratic legitimacy with the Chinese people to govern by providing a procedural outlet for public input and local government accountability (thereby staunching the complaints and criticism appearing on the Internet and elsewhere); (2) strengthen environmental protection; and (3) irrespective of decision-making on any individual construction project, collect information that will contribute to and enhance policy and policy implementation (Xia, 2005; Licensing Hearing System, 2005; China's Environmental Protection, 2005; Expert A, 2005). Over the last two to three years, local government officials have started to experiment with ways to better advance these goals. Nevertheless, significant legal, institutional, and political obstacles continue to pose a challenge to full and

satisfactory development of public participation in China, obstacles that may not, due to a lack of political will and anxieties about public disorder, be resolved unless legal advocates are able to develop their role, without fear of reprisal, to help affected parties lay claim to their participation rights under law.

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REFERENCES

Administrative License Law. (*Xingzheng xuke fa*). [On-line]. Available (English): http://www.ec.cn/pubnews/2004_03_12/200585/1004237.jsp.

Alford, William P.; Liebman, Benjamin L. (2001). "Clean air, clean processes? The struggle over air pollution law in the People's Republic of China." *Hastings Law Journal*, 52, 703-747.

Alford, William P.; Shen, Yuanyuan. (1997). "Limits of the law in addressing China's environmental dilemma." *Stanford Environmental Law Journal*, 16, 125-148.

American Bar Association Internal Project Review (September 2005). [Cited as "ABA Report, 2005"]

Beijing Haidian People's Court Administrative Redress Adjudication 2004 No. 271. (2005, January 14). [On-line]. Available: http://bbs.soufun.com/post/1175_23954008_23954008.htm. [Cited as: Haidian People's Court, 2005]

Bie Tao. (2005, September 26). "Environment law system in China." *China Daily*, p. 8.

China's environmental protection administrative licensing hearing system. (2005, December 16). Presentation at ABA/SEPA Sino-U.S. Environmental Governance and Public Participation Training Program, Shijiazhuang. On file with the authors.

Chuan, Qin. (2005, January 19). "Green law suspends projects." *China Daily*, p. 1.

Cohen, Jerome Alan. (2005, November). "China trips up its barefoot lawyers." *Far Eastern Economic Review*, 17-20.

Congressional-Executive Commission on China. (2005). *Annual Report 2005*. Washington, DC: U.S. Government Printing Office. [On-line]. Available: <http://www.cecc.gov>.

Congressional-Executive Commission on China. (2006, June). "ACLA, justice bureau opinions restrict lawyer involvement in sensitive, mass cases." [On-line] Available: <http://www.cecc.gov/pages/virtualAcad/index.phpd?showsingl=53561>.

Convention on access to information, public participation in decision-making and access to justice in environmental matters. [On-line]. Available: <http://www.unece.org/env/pp/documents/cep43e.pdf>.

Economy, Elizabeth C. (2004). *The river runs black*. Ithaca: Cornell University Press.

Economy, Elizabeth C. (2005). "Environmental enforcement in China." In Kristen A. Day (Ed.), *China's environment and the challenge of sustainable development* (pp. 102-120). Armonk, NY: East Gate.

"Environmental public interest litigation: From concept to practice." (2005, December 17). Presentation at ABA/SEPA Sino-

- U.S. Environmental Governance and Public Participation Training Program, Shijiazhuang. On file with the authors.
- Expert A. (2005, September 19). Interview, Beijing. Notes on file with the authors.
- Expert B. (2006, January 18-20). Telephone interviews, Beijing. Notes on file with the authors.
- Ferris, Richard J., Jr. & Zhang, Hongjun. (2002). "The challenges of reforming and environmental legal culture: Assessing the status quo and looking at post-WTO admission challenges for the People's Republic of China." *Georgetown International Law Review*, 14, 429-460.
- Ferris, Richard J., Jr. & Zhang, Hongjun. (2005). "Environmental law in the People's Republic of China: An overview describing challenges and providing insights for good governance." In Kristen A. Day (Ed.), *China's environment and the challenge of sustainable development* (pp. 66-101). Armonk, NY: East Gate.
- "Guiding opinion of the all China lawyers association regarding lawyers handling cases of a mass nature." (effective March 20, 2006).
- "Halt of projects good for environment." (2005, January 24). *China Daily*, p. 6.
- "Hearing system of environmental administrative licensing and its implementation." (2005, August 21). Presentation at ABA/SEPA "Sino-U.S. Public Participation & Environmental Administrative Licensing Public Hearing Training, Urumqi." On file with the authors. [Cited as "Licensing Hearing System"]
- "High degree of difficulty in technological skills needed for Old Summer Palace EIA—EIA work unit still not found." (2005, April 20). *Jinghua Times*.
- Horsley, Jamie P. (2006). "Access to government information in the People's Republic of China." In *The bowker annual: Library and book trade almanac 2006*. (pp. 291-310). New Jersey: Information Today, Inc.
- Jia Feng. (2005). "Public participation, thinking to practicing." *World Environment*, 5, p. 1.
- Kahn, Joseph. (2005, December 28). "When Chinese sue the state, cases are often smothered." *The New York Times*, p. 1.
- Kahn, Joseph. (2006, June 27). "China may fine news media to limit coverage." *The New York Times*, p. 1.
- Liebman, Benjamin L. (2005). "Watchdog or demagogue? The media in the Chinese legal system." *Columbia Law Review*, 105, 1-157.
- Ma, Josephine. (2005, August 18). "Green groups fall under microscope." *South China Morning Post*, p. 7.
- "Measures on promoting public participation in environmental impact assessment." [On-line]. Available: <http://www.sepa.gov.cn/eic/649094490434306048/20051110/12698.shtml>.
- "Measures on promoting public participation in environmental impact assessment" will soon appear publicly—SEPA solicits opinions from the whole society." (2005, November 10). SEPA website announcement. [On-line]. Available: <http://www.sepa.gov.cn/eic/649094490434306048/20051110/12698.shtml> [Cited as: SEPA Solicitation of Public Comment 2005]
- "Measures on public participation in environment" ("Shenyang Measures"). (2002). On file with the authors.
- Ni, Ching-Ching. (2006, August 10). "Wave of social unrest continues across China." *Los Angeles Times*. [On-line].
- "Old summer palace administrative management office: Anti-Drainage plan does not impact the Environment." (2005, March 31). *Jinghua Times*.
- Old summer palace east lake anti-drainage construction project environmental impact assessment report. (2005, June 30; publicly released July 5, 2005). [Cited as: Yuanmingyuan EIA Report, 2005]
- Orts, Eric W. (2003). "Environmental law with Chinese characteristics." *William and Mary Bill of Rights Journal*, 545-567.

- Pan, Philip P. (2005, November 26). "Chinese officials sought to hide toxic spill." *Washington Post*.
- Rohan, Brian. (January 27, 2003). "Clearing the air: The human rights and legal dimensions of China's environmental dilemma," Statement to Congressional-Executive Commission on China. [On-line]. Available: <http://cecc.gov/pages/roundtables/012703/rohanStmt.php?PHPSESSID=c458216f15159b7c0dad704c0a615dee>.
- SEPA 2005 Administrative redress decision No. 21 (Wu Zhenping, Yang Fuchun, and 40 others). (2005, April 1). [Cited as: SEPA Decision No. 21]
- SEPA 2005 Announcement No. 13 (public notice of public hearing on EIA of Old Summer Palace anti-drainage project to be held on April 11, 2005). (April 5).
- SEPA. 2005 Circular No. 117, "Public notice concerning old summer palace renovation project environmental impact assessment public hearing." (April 11).
- "SEPA Demands that old summer palace conduct comprehensive revision of anti-seepage project." (2005, July 7). *People's Net*. [On-line]. Available: <http://news.sina.com.cn/c/2005-07-07/10506374666s.shtml>.
- "SEPA says old summer palace need not resubmit revised report." (2005, July 14). *Huaxia Times*. [On-line]. Available: <http://news.sina.com.cn/c/2007-07-14/00506427405s.shtml>.
- "SEPA Vice Minister Pan Yue criticizes EIA work units for not daring to take responsibility." (2005, May 11). SEPA website news report. [On-line]. Available: <http://www.zhb.gov.cn/eic/649094490434306048/20050511/7499.shtml>.
- Si Yu. (2005). "Learn to do 'hearing'," *World Environment*, 5, p. 8.
- Tang, Shui-Yan; Tang, Ching-Ping; & Lo, Wing-hung. (2005). "Public participation and environmental impact assessment in Mainland China and Taiwan: Political foundations of environmental management." *The Journal of Development Studies*, 41(1), 1-32.
- United States Embassy/Beijing. (2003). "Chinese NGO's: Carving a niche within constraints." [On-line]. Available: <http://www.usembassy-china.org.cn/sandt/ptr/ngos-prt.htm>.
- "Workshop case study compilation." (2005). From "ACLA-ABA Environmental Public Interest Litigation Workshop," Chengdu, Oct 29-30, 2005. [Cited as: ACLA Workshop Materials, 2005].
- Xia Aimin. (2005). "Harmonious society can not be built without 'public participation'." *World Environment*, 5, p. 10-14.
- Yang, Xiao. (2005, November 7). "More say in decision making." *China Daily*, 8.
- Yardley, Jim. (2005, December 26). "Seeking a public voice on China's 'angry river'." *New York Times*, p. 1.
- Zhu Xiao. (2004, November 18). "Critique of procedural problems in the nation's first environmental administrative license public hearing case." *China Citizen's Commercial Law Net*. [On-line]. Available: <http://www.jcrb.com/zyw/n7/ca435116.htm>.
- Zusman, Eric; & Turner, Jennifer. (2005). "Beyond the bureaucracy: Changing China's policymaking environment." In Kristen A. Day (Ed.), *China's environment and the challenge of sustainable development* (pp. 121-149). Armonk, NY: East Gate.

NOTES

1. The information and conclusions presented in this paper largely reflect the authors' personal experiences from 2002 through 2005 as the American Bar Association (ABA) worked with SEPA, local environmental protection bureaus, the bar, quasi-governmental organizations, and civil society groups, to advance good governance practices in the environmental area. For a description of the ABA's environmental governance work, see Rohan (2003).

2. Notably, Chinese citizens often resort to petition and protest when legal grievance channels have been closed to them, and the government's response can lead to violence.

3. This definition is consistent with international definitions. The international standards, as articulated in the 1998 Convention on Access to Information, Public

Participation in Decision-making and Access to Justice in Environmental Matters (the “Aarhus Convention”) state that public participation has three components: access to justice; public participation in environmental decision-making; and access to justice in environmental matters.

4. Public participation and other good environmental governance principles were first articulated in connection with EIA requirements under the Environmental Protection Law (EPL), provisionally promulgated in 1979 and adopted in 1989. The EPL required EIA reports to be prepared for construction projects, but delegated legal authority for establishing the environmental review and approval criteria to various local-level governments (Art. 6). Citizens were also accorded the right to bring charges against entities or individuals causing pollution and damage to the environment (Art. 8). The discretion left to local authorities to conduct public hearings led to a regulatory process that excluded almost any form of public participation (Tang, Tang, & Lo, 2005; Ferris & Zhang, 2005). For an excellent overview of the structure of China’s environmental law regime, see Ferris and Zhang (2002, 2005) and Bie (2005).

5. In a survey conducted by the All-China Environment Federation between December 2004 and June 2005, 97.2 per cent of the surveyed public said the nation should collect more information from them when mapping out plans and making decisions in the nation’s environmental protection (Yang, 2005).

6. The EIA Implementing Measures overlap to some extent with the ALL Implementing Measures, which concern EPB obligations for licensing of projects requiring EIA, primarily at the hearing stage. Solicitations for comment in the EIA Implementing Measures were requested (in Chinese) at <http://www.sepa.gov.cn/eic/649094490434306048/20051110/12698.shtml>.

7. The Shenyang Measures, first adopted by the Shenyang EPB as internal rules in 2002 (predating even the 2003 national EIA Law), became municipal law in 2005.

8. The evolution of implementing regulations may reflect a gradual introduction of debated or controversial points considered during the drafting of the ALL and the EIA Law. For a fascinating discussion of the evolution of legal standards in the environmental area, see Alford & Liebman, 2001.

9. The EIA report also found that the project would have a certain impact on the visual landscape of the Summer Palace—thus touching coincidentally on the neighboring area to the Old Summer Palace area that became the site of controversy in the 2005 Yuanmingyuan case.

10. Negotiations (and conflict) between community residents and the power company also have continued beyond the hearing, with the result that the power company has voluntarily removed the transmission towers closest to the Summer Palace,

but has dismantled the physical barriers erected by residents to complete construction on others within the Baiwangjiayuan residential community. The Baiwangjiayuan community maintains a website with information, chat board, and news links related to the Baiwangjiayuan project. See <http://seek.focus.cn/results.jsp?gid=800&sid=&ct=f&clg=1&q=>.

11. The relatively well-off Baiwangjiayuan community hired private lawyers to bring the case.

12. A 2004 feasibility study and report on the lake bottom-lining plan was prepared internally by the Park Administration, based on the 2002 Beijing Olympics plan and a 2000 study by the Beijing City Planning Research Institute that was approved by the Beijing City Government and the National Department of Culture. None of these studies or plans were made public (See ACLA Workshop Materials, 2005).

13. The site is still active, with links to dozens of articles published on the issue (in Chinese only). See <http://news.sina.com.cn/z/ymypm/index.shtml>.

14. A website devoted to covering the Yuanmingyuan anti-drainage project’s environmental impact and related policy developments has posted a collection of viewpoints quoted from experts, NGOs, environmental protection authorities, and park officials. See <http://news.sina.com.cn/z/ymypm/index.shtml>.

15. The report is available (in Chinese) at: www.sepa.gov.cn/eic/649083521138163712/20050705/9349.shtml.

16. Environmental advocates appealed SEPA’s approval of the EIA report within the administrative review process. SEPA affirmed the approval, citing as its basis the prior approval by the Beijing municipal government of the overall Yuanmingyuan water drainage and conservation scheme. Chinese legal experts have noted the constitutional problem of a central government authority abdicating its independent review role and relying instead on approvals by a local government authority. It also shows the relative strength of the Beijing municipal government (Environmental Public Interest Litigation, 2005).

17. Some other public hearings on environmental impact have reportedly been held, with no available public record and little or no NGO, media and scholarly attention. These include a public hearing by the Hebei EPB on environmental impact of an application to expand construction on a power plant in Xibaipo in 2004, and a public hearing by the Beijing EPB on environmental impact of a proposed cell phone components plant near a Beijing residential community in 2005.

18. In response to SEPA’s action, responsible government authorities and project officials on some of the projects publicly asserted (apparently without basis) that they *had* met all legal requirements. Because of this and similar misinformation or lack of information surrounding the projects, local residents in many cases did not complain or request environmental hearings, lacking the

information that would have been the basis for lodging a complaint (*suyuan*) about failure to hold one.

19. China's 1996 Administrative Penalty Law also provides the right to a hearing on the imposition of administrative penalties. Such hearings are different in scope and purpose from public hearings to inform policy decisions.

20. The Opinion is similar to a series of recent opinions at the local and provincial level that restrict the participation of lawyers in sensitive rights defense work (See CEEC, 2006).

21. On 14 June 2006, a new initiative called "China Lawyer Watch" held a spirited debate on the ACLA opinion and freedom of legal practice. See <http://www.ccwlawyer.com/index.asp>, for a summary of opinions expressed at the forum.

22. Specifically, the Provincial EPB imposed on the Chuanhua LLC parent company an administrative fine of 1,000,000 Yuan and fees of 4,050,000 Yuan, and required it to pay 11,000,000 Yuan in compensation to fisheries, of which 3,500,000 Yuan was put toward water cleanup and fish recovery.

23. See http://www.epd.gov.hk/eia/english/textonly/aspd_298.html.

24. It remains uncertain how "sudden events" will be interpreted, but it is anticipated that the term will extend to incidences of environmental pollution (Kahn, 2006).

25. These requests followed a local publicity campaign in Shenyang (through newspaper ads and "fairs" with information booths) to make the new rights under the Measures known to the public. Naturally, the demand for environmental information is likely to be strongly related to efforts to publicize the right to obtain it. For a broader discussion of the complex system of news media control, affecting more than just environmental information, see Liebman (2005).

26. In addition to the ABA's program discussed herein, the World Bank, GTZ, and the United

Kingdom's Department for International Development (DFID) have all worked with Chinese governmental partners on environmental governance projects; Environmental Defense, General Electric, and others have introduced projects aimed at building civil society capacity in environmental governance (*Editor's Note: See the Inventory of Environmental and Energy Projects in China in this and previous issues of China Environment Series for information on other organizations*).

27. Baiwangjiayuan illustrated the problems that can occur when only lay advocates are involved; in this case, citizens made demands for issues to which they had no legal right, e.g., requests that the EIA and environmental license approval take into account the property values of homeowners affected.

28. See the Wuhan EPB Q & A page at: www.hb12369.com.

29. Under current Chinese law, public prosecutors are limited to enforcement of criminal (not civil) laws.

30. The development of public interest litigation is still nascent, and will face its own set of hurdles as it develops. For example, China has a very rigid application of standing in pursuit of public interest cases (Alford & Shen, 1997). China's groundbreaking public interest lawyers are thus seeking to define and expand their ability to bring cases on behalf of citizens. In one very interesting recent test case, three Peking University law professors represented the fish, an island, and the water itself in the Songhua River to sue for compensation (to be dedicated to remedial measures) for harm caused to the ecosystem from the benzene spill. The Heilongjiang court in which the case was filed rejected the case for the lawyers' lack of connection to the subject matter. It also made the (surprising) argument that the subject was properly not in front of the court system because it was being resolved by the State Council—a statement that perhaps reflects reality but does not reflect constitutional procedure under Chinese law.

Yuanmingyuan's Shifting Landscape: From Emperor's Resort to a Public Green Space

By Linden Ellis

Nestled among the bustling Haidian District in Beijing is the famous Yuanmingyuan (Old Summer Palace). Once the sparkling private playground of the Qing emperors, the changing state of this 350-hectare garden reflects the prosperity, political aspirations, and whims of past rulers and looters of China. For example, at the violent start of the Qing Dynasty, the Manchu invaders used the gardens as a political tool to show how similar they were to the native Han Chinese, helping to establish the legitimacy of their new government. In 1860 and 1900, Yuanmingyuan was looted and destroyed by foreign powers. During the early years of the Communist regime the gardens' "bourgeois" brick buildings were taken apart to build homes and pigsties, and its lakes silted to form rice patties. It was converted into a public park after the Cultural Revolution. A new kind of "looting" of Yuanmingyuan has emerged over the past few years, as developers eye this valuable piece of land for luxury housing and amusement parks. In response, new political and cultural forces are pushing Yuanmingyuan through yet another metamorphous—into a protected green space for nature hungry urbanites. The well-publicized debates over the garden are but a microcosm of the broader environmental movement in China. Public demands to protect the park have led to the following environmental victories.

Preservation of natural lakes. In late 2004, controversy erupted over the installation of impermeable lining in Yuanmingyuan's lakes. A Lanzhou professor's website tipped off journalist Zhao Yongxin that the Yuanmingyuan authorities had not conducted a mandatory environmental impact assessment (EIA) on the lining project, already halfway completed. Public outcry then pressured the State Environmental Protection Administration (SEPA)

to suspend the project and put a 40-day deadline on completing the EIA. The assessment revealed the lining would so alter drainage as to cause an environmental hazard to the local ground water. After one public hearing, SEPA announced the project would be halted, although the installed linings were allowed to remain. In December 2005, Zhao Yongxin was recognized as one of five recipients of SEPA's new Green China Awards.

Protection of native flora. The increasingly vigilant public discovered in April 2005 that Yuanmingyuan workers were replacing well-established native flora with cultivated ornamentals on a massive scale as part of the Olympics preparation. These new plants would require more watering, fertilizers, and frequent replacements in the garden, altering the natural landscape and threatening species of plants and animals living in this little oasis. A reevaluation of the natural landscaping of the garden is underway in response to public criticism.

Limitation on development. Reports condemning all forms of profiteering by Yuanmingyuan officials have been widely circulated in Chinese newspapers. On 25 May 2005, *Xinhua* reported that authorities were renting an island in the park to two wealthy comedians, which prompted the two to make a hasty retreat. In conjunction with such complaints, authorities are slowly emptying ten-year old South Pacific style luxury villas in the eastern section of the park, and have announced that, "...all planned amusement projects, including a bumper car ride and water related entertainment facilities, have been scrapped."¹ The goal is for the park to reflect its new official theme of historic and environmental preservation.

These efforts to halt profit seeking and protect the environmental integrity of Yuanmingyuan

demonstrate both a vigilant corps of environmental journalists and the public's desire to preserve what little green space remains in Beijing. Most strikingly is how heavy public pressure has changed the political dynamics on how decisions are made in managing this park. For example, currently public hearings are being held on all park development projects. The green and the political landscapes are shifting; perhaps, these two changing landscapes of Yuanmingyuan will continue to reflect and be reflected throughout the rest of the country.

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NOTES

1. "Old Summer Palace in new controversy." (May 25, 2005). *Xinhua: English*, <http://english.sina.com/china/1/2005/0525/32204.html>

The Asia Program at the Woodrow Wilson Center



Zhou Yongming

China and Democracy: A Contradiction in Terms

All participants at this 22 March 2006 Asia Program event agreed that while there has been some progress towards democracy in China over the past decade, especially in terms of individual freedoms, there are definite limits on how far the Chinese government is prepared to tolerate genuine pluralism. **Merle Goldman** of Harvard University explored how select groups of intellectuals, journalists, businessmen, lawyers, and ordinary citizens have been calling for political reform, challenging the party and its policies, and attempting to assert their political rights. **Suisheng Zhao** of the University of Denver noted that the Party itself has promulgated a host of laws to try and make it more responsive to the people, but that such “rule of law” is more paternalistic than democratic. **Zhou Yongming** of the University of Wisconsin discussed Internet politics in China, asserting that the West often focuses only on the issue of freedom of information on the Internet, while overlooking how such information is being received. Dr. Goldman also summarized a paper by UCLA’s **Richard Baum** that pointed to the limits of “consultative Leninism” and warned that the current system may already be living on borrowed time.

China’s NGOs: Independent Actors or Government Puppets?

In a 15 May 2006 event co-sponsored by the Asia Program and the China Environment Forum, Syracuse University’s **Hongying Wang** noted the tremendous explosion of nongovernmental organizations (NGOs) in China, from almost none a decade ago to over half a million (registered and unregistered) today. In her opinion, the trajectory is for NGOs in China to keep moving towards greater autonomy. **Joseph Fewsmith** of Boston University presented the case study of flourishing trade associations in Wenzhou, a city in China’s booming east. **Jennifer Turner** of the Wilson Center’s China Environment Forum stated flatly that environmental NGOs are the vanguard of civil society development in China. **John Callebaut** of the Center for International Private Enterprise, which works to develop Chinese trade associations, said such associations were not puppets, but conceded that there is an inherent tension between them and local government.

For special reports on these and other Asia Program meetings or to receive Asia Program meeting invitations please go to www.wilsoncenter.org/asia or contact Mark Mohr at mark.mohr@wilsoncenter.org.



Hongying Wang

China's Evolving Civil Society: From Environment to Health

By Drew Thompson and Xiaoqing Lu

Slightly over a decade ago, the Chinese leadership recognized the escalating environmental cost of economic development and decided to engage social organizations to support its environmental awareness and protection campaigns. Environmental nongovernmental organizations (ENGOS) have emerged and expanded in the 1990s, carving a space that is politically non-threatening to the Communist Party and government. The central government recognizes the social and economic importance of protecting the environment and the role NGOs play in mobilizing the population towards that end. The continued growth of ENGOS is assured, particularly due to growing popularity for supporting environmental issues among the population, but importantly also because of the willingness of NGOs to pursue their interests within well-defined, yet unwritten political boundaries that assure the continued leadership of the Party and the government. Like environmental degradation, a weak healthcare system unable to effectively deal with emerging infectious diseases threatens to undermine economic growth and social stability. While the previous generation of Chinese leaders oversaw the emergence of "green" NGOs and actively enabled their growth, the current generation of leaders took power in the midst of the 2003 severe acute respiratory syndrome (SARS) outbreak and has subsequently invested greater attention and resources in improving public health, including the incubation of health NGOs. Health NGOs seem poised to make up the "second wave" of civil society development in China.

Following the founding of the People's Republic of China in 1949, the Communist Party and government dominated all aspects of social and economic development under a "people's dictatorship" whereby all classes of society and the entire economy would submit to absolute government leadership. Independent social groups were not permitted, but citizens were, in theory, given voice through government-controlled "mass-line" organizations like the All China Women's Federation, Communist Youth League, and ministry-controlled associations such as the China Family Planning Association. The suppression of independent social groups and other forms of civil society lasted until 1979, when the government, as part of the "reform and opening" policy of free market economic development and political liberalization, began to gradually decentralize authority and play a less active role in the daily life of citizens, opening up greater space for social freedom. Extensive reform of the legal system, including the drafting of numerous laws and policies in the

1990s, began permitting the cautious development of a civil society sector and the legal establishment of NGOs in China.

The rapid reform of Chinese society has catalyzed greater wealth and permitted more personal freedoms, which have created many new health and environmental problems. These developments have catalyzed the growth of independent NGOs in multiple sectors and fostered the emergence of new government organized nongovernmental organizations (GONGOs), such as the Chinese Association for the Prevention of STDs and AIDS and the All-China Environment Federation. The growing activism and independence of GONGOs from their supervisory ministries is a fascinating trend that will shape the landscape of China's civil society. However, this paper explores how Chinese ENGOS were the first civil society groups to emerge in the mid-1990s, and how the political situation has shifted to allow the growth of NGOs in the health sector, particularly groups focusing on HIV/AIDS. These complementary sectors operate in a dynamic political sphere

that can either foster or hinder their growth and success, shaping their performance at the same time that their actions—as well as exogenous political factors—shape their operating environment.

While the previous generation of Chinese leaders oversaw the emergence of “green NGOs” and actively enabled their growth, the current generation of leaders took power in the midst of the 2003 SARS outbreak and has subsequently invested greater attention and resources in improving public health, including the promotion of health NGOs; an area that is set to become the “second wave” of civil society development.

NGOS AND ENVIRONMENTAL PROTECTION

China’s economic growth has greatly increased the standard of living for many, enhancing the opportunity for increased social freedom. Similar to many Western countries during their phases of rapid industrial expansion, China neglected the environmental consequences of unbridled economic growth since the opening and reform period began. Preoccupation with economic growth at all levels of government caused significant air and water pollution as well as general ecological deterioration. This degradation has had significant social and economic impacts, particularly on the poor and disadvantaged, further exacerbating economic divides between the haves and have-nots. In extreme cases the deteriorating environment has caused social unrest, and more broadly, reduced economic growth. According to a 2003 report by the RAND Corporation, the impact of water pollution on human health in China costs about \$4 billion annually. The same report cites a World Bank estimate that water pollution is costing China \$3.9 billion annually, amounting to 1 percent of GDP as of 1995 (Wolf, 2003).

It has become clear to the central government that without effective pollution control and protection measures, environmental problems will limit economic growth, hampering efforts to absorb new workers entering the economy along with workers laid off from the state sector. The inability to consistently stimulate job creation could also potentially contribute to social unrest.

While officials in Beijing routinely pass laws to protect the environment, local officials and factory managers often collude to evade them (Economy, 2005). Aside from strengthening regulations and pressuring the bureaucracy to crack down on

polluters, pragmatists within the top leadership calculated that green NGOs presented an alternative approach to mobilize the population to join the government’s effort. The government, particularly at the highest levels, sees benefits in encouraging the population to report local polluters, enhance public awareness, and most recently participate in the environmental impact assessment (EIA) process. However, local-level officials, who often represent the same government that owns the polluting companies, are often less enthusiastic about enabling citizens to challenge their authority and government-supported industries. Nevertheless, the commitment of senior leadership to environmental protection has continued unabated, and gradually the environmental sector has become a relatively safe arena for civil society involvement and activism.

The advent of a permissive policy environment for NGOs was marked in 1994 by the founding of China’s first ENGO, Friends of Nature (FON). This organization, led by the distinguished Chinese scholar Liang Congjie, was the first citizen-organized social group to legally register in China. Since then, the government has permitted numerous green groups to register and encouraged them to enhance public awareness through environmental education, clean-up campaigns, and to attract financial and technical support from foreign organizations that are unwilling to work directly with the Chinese government (Schwartz, 2004). Grassroots environmental activists have expanded to fill the space provided by the government and actively pushed for greater public participation in policymaking.

ENGOs have proven themselves pragmatic and flexible, establishing successful partnerships with international NGOs and foreign donor governments. This pragmatism is reflected in the activities of not only registered NGOs, but also through the many unregistered green organizations. While approximately 2,000 environmental groups have officially registered as NGOs, perhaps the same number is registered as for-profit business entities, while even more—such as Internet, volunteer, or nature clubs—are not registered at all (Economy, 2005). There are also environmentally oriented student groups and “green clubs” on college campuses across China. This diverse group of green NGOs has been at the forefront of true civil society development, creating an officially accepted and recognized nongovernmental sector in a political and social system that was completely government-dominated for 40 years.

The Role of Environmental NGOs in China

The past decade has established that NGOs are an important force supporting the environmental efforts undertaken by the Chinese government. Successful NGOs, such as Friends of Nature, Global Village of Beijing, and Green Earth Volunteers, have played a valuable role in the environmental movement thus far by advocating for more effective enforcement of existing regulations, increasing government accountability, educating the public, and—to a lesser degree—even shaping policy.

Unlike the relationship between many Western ENGOs and their home governments, NGOs in China take a much less confrontational approach. The majority of NGOs are genuinely committed to environmental protection and working closely with the government to achieve their goals, thereby having a positive impact on public policy and various levels of government. The central government in particular, has made ongoing efforts to engage and encourage ENGO participation. For instance, the 1996 State Council Decision Concerning Certain Environmental Protection Issues encourages public reporting on, and exposing of, violations of environmental protection laws and regulations, and participation in environmental protection (Ma & Ortolano, 2000). By working closely with the government in a non-confrontational manner within a mandated framework, ENGOs have established a certain level of trust and gained the support of the many officials, who view their actions as a positive contribution to China's environmental challenges.

Emerging green NGOs in China have played a pioneering role in promoting civil activism and volunteerism across the country. By mobilizing the public and popularizing the cause of environmental protection, green NGOs have not only educated citizens to become active participants in shaping policy, but also have helped embolden the news media. Newspapers and magazines have actively reported on the state of the environment, increasing government accountability, particularly when the government has been derelict in their responsibility. Most notable were the proactive journalists who worked with NGOs to report on the planned dams along the Nu River (Nujiang), for which local governments had not completed the required EIA. The media blitz surrounding the story in the fall of 2004 led Premier Wen Jiabao to temporarily halt the planning process. The contamination of the Songhua River in Jilin and Heilongjiang provinces, which caused water supply system stoppages in Harbin in

November 2005, was widely reported by the news media, placing significant pressure on government officials who had been less than forthcoming with accurate information at the outset of the accident. Increasingly, green groups and journalists have acted as agents of social change and begun to build the notion of public participation and grassroots action in China, and contributed to increased accountability of government.

Reaching the Limits?

Although Chinese ENGOs have steadily grown in size, scope, and influence, the government remains apprehensive of unfettered NGO development and continues to vigorously control and manage the sector's development. Following the retirement of Jiang Zemin and the ascension of Hu Jintao with the "fourth generation" of leaders, the environment for civil society has subtly changed, reflecting the new leadership's preoccupation with the influence of global political events and consolidating their power internally. The leadership has supported increased suppression of dissidents and tightened controls on NGOs to ensure they do not become a base for opposition to the Communist Party. This apprehension stems in part from the national campaign led by Chinese NGOs pushing for greater transparency in decision-making for dam building. Another issue driving this tension is the top leadership's concern about the "color revolutions" that have occurred in Serbia, Georgia, Ukraine, and Kyrgyzstan. Chinese studies of these revolutions have led senior leaders to conclude that opposition movements in these countries were strongly backed by international organizations, causing the government to focus increasing attention on Chinese civil society groups and international NGOs.

According to an October 2005 article in *Foreign Policy*, the Chinese Communist Party Propaganda Department has identified several international NGOs, including the International Republican Institute, National Endowment for Democracy, U.S. Institute of Peace, and the Open Society Institute, as organizations that brainwash local people and encourage political opposition (Yongding, 2005). A new NGO registration law that was anticipated to render more freedom to civil society organizations has been postponed; while the Chinese Ministry of Civil Affairs has presently stopped registering foreign organizations, pending thorough investigations conducted by public security bureaus. Since the summer of 2005, ENGOs have been the subject

of strict scrutiny, evidenced by a nationwide survey conducted by Chinese officials to determine the nature of green groups' work and uncover unregistered organizations. The survey report, released by the State Environmental Protection Administration (SEPA) in May 2006, suggested that the government's effective management and NGOs' strict self-discipline are two essential elements for further development of Chinese ENGOs ("Chinese Environmental," 2006).

In this currently restrictive political period, many grassroots "social entrepreneurs" are adopting a variety of creative identities and approaches in order to cope with potential or actual official suspicions while they continue to explore the limits of environmental activism. The government is caught in the uncomfortable contradiction between achieving goals of environmental protection, sustained economic growth, and the prevention of excessive social activism. The political atmosphere reflects the senior leadership's own sense of insecurity as they consolidate power following the 2002 16th Party Congress and their concerns over the global march of "democracy." As the current leadership becomes ensconced, an optimistic prediction would be that the political atmosphere for NGOs will improve as the growing need for the government to engage the population on environmental protection issues increases.

In addition to external political pressures, long-term growth of the ENGO sector is constrained by numerous structural factors, including limited internal capacity and access to resources. Many NGOs lack systematic knowledge of NGO management and have little access to information and funding for capacity building. The current generation of ENGOs often relies heavily on charisma and enthusiasm of individual leaders. Further development of the sector will require strengthening of governance, staffing, and internal management. There is also criticism that Chinese green groups have done a better job at identifying environmental problems rather than proposing technical solutions. As they move forward to address more problems, green NGOs need to dramatically improve their technical skills and find ways to deliver solutions, rather than simply raise awareness. Additionally, the majority of green groups rely heavily on foreign funding; in the face of tightened government scrutiny of foreign-funded activities, Chinese NGOs will increasingly be forced to seek alternative sources, despite legal restrictions on domestic fundraising.

Growing environmental problems helped create political space for Chinese ENGOs, which laid the foundation for greater social activism in areas beyond the environmental sector. Health NGOs have become particularly active over the past few years as reforms and the privatization of the health sector have produced inequalities in health services and poor public health system capacity to address looming crises from infectious diseases, such as SARS, HIV/AIDS and avian influenza.

NGOS AND PUBLIC HEALTH

Following the Communist Party's rise to power in 1949, investments in the healthcare sector greatly contributed to significant gains in public health, measured by greater life expectancy, reduced infant mortality, and the reduction or elimination of several infectious diseases, including sexually transmitted diseases. Primary health care and preventative health services were widely available and the majority of the population had access to health services and insurance. However, since the reforms began, the healthcare system has increasingly privatized, insurance coverage has greatly decreased, and steadily fewer citizens can access or effectively utilize the healthcare system. A recent report released by the Ministry of Health indicated that healthcare reform has been "unsuccessful" (Gao, 2005). Tragically, as the healthcare system has declined and service provision predominantly serves the affluent—infectious diseases have presented highly visible challenges to the government-led public health system. Recognizing it is ill-equipped to tackle these challenges, the government is increasingly seeking support from outside, mobilizing international resources and technical support, and calling upon "all sectors of society" to play a role in suppressing infectious diseases.

The 2003 outbreak of SARS—initially downplayed by the government—demonstrated the health system's vulnerability. International and domestic pressure forced the government to belatedly deal with the crisis by mobilizing considerable resources to address the outbreak; highlighting to the top leadership the potential social and economic impact of an unchecked epidemic, stimulating greater commitment and cooperation with international organizations to addressing other infectious diseases. Diseases such as HIV/AIDS pose particular challenges on a number of fronts. Having emerged in tandem with the economic

// A recent report released by the Ministry of Health indicated that healthcare reform has been “unsuccessful.”

reforms of the 1980s and 1990s, HIV/AIDS has spread along with growing affluence, increased personal mobility, and the dismantling of many state structures that previously controlled so many aspects of the average Chinese citizen's life. Other diseases, such as avian influenza, as well as the threat of a pandemic human influenza, pose unique economic and social threats. The massive scale, scope, and cost of mounting an effective response in a timely fashion reduce the likelihood that the government alone can avert a pandemic.

HIV/AIDS poses a major concern because of its significant socioeconomic impacts, affecting young people at the most productive periods of their lives. The virus can also spread undetected from asymptomatic carriers for up to ten years. In China, HIV/AIDS remains concentrated among marginalized populations that the government is ill equipped to effectively reach, such as intravenous drug users and commercial sex workers. Other populations disproportionately impacted include men who have sex with men (MSM)¹ and former plasma donors who contracted HIV donating plasma in unhygienic blood selling stations in Henan Province and other rural areas. While the epidemic is concentrated among these marginalized groups, there is concern that HIV is spreading; recent government statistics establish that China has approximately 650,000 HIV/AIDS cases. Although the new estimate is lower than previous figures, the rate of infection is still rising, with 70,000 new cases in 2005 (PRC Ministry of Health, 2006). In 2002, UN health officials predicted if the epidemic was left unchecked, the number of people living with the virus would exceed 10 million by 2010 (UNAIDS, 2004). However, ahead of the 2005 World AIDS Day, the Chinese Ministry of Health pledged strong nationwide preventive measures that they expect will keep the total below 1.5 million over the next five years.

Government's Response to the HIV/AIDS Crisis

To gain a sense of the potential of health NGOs becoming a strong force for change in China, it is

instructive to consider the emergence of Chinese NGOs that specifically address the HIV/AIDS epidemic. HIV/AIDS garners significant political attention, both domestically and internationally, and considerable global resources are channeled to fight the disease; key factors which support the NGO community. Because HIV/AIDS in China is still primarily concentrated among intravenous drug users, commercial sex workers, and men having sex with men, the government's public health system is particularly unprepared to address the root causes of the spread of HIV, which are primarily socioeconomic, rather than purely medical (Thompson, 2005). Like all countries that confront the dual epidemics of drug abuse and HIV/AIDS, China's government must address the illegal activities associated with HIV transmission.

Responding to HIV/AIDS and other diseases will undoubtedly require national responses that are well beyond the capability and means of the government health system alone. Despite the lessons from the government's failed attempts to cover up the SARS outbreak in 2003, transparency and timely delivery of accurate information about health-related events is not always forthcoming. Multiple ministries that are tasked with responsibilities addressing various health threats often do not coordinate their efforts. Additionally, China's top-down bureaucracy has few mechanisms for effectively reaching out to citizens who are outside of the formal economic and political system. The government is acutely aware of the need to mobilize the nongovernmental sector to respond to health challenges and to help make up for gaps in the government's healthcare provision system; effective prevention and control requires mobilizing civil society organizations and formalizing public-private partnerships.

While the government has allowed the growth of ENGOs over the past 12 years, the political atmosphere for health NGOs (particularly in the HIV/AIDS field) has only recently improved, highlighted by multiple statements made by government officials in 2005:

• In spring 2005, at a Beijing summit on HIV/AIDS in Beijing, Vice Premier and then Minister of Health Wu Yi said that the nation's anti-AIDS campaign cannot be won by the government alone, and that, “China has formed a mechanism and social environment featuring the leading role of the government, cooperation of various departments and participation of the whole society.”²

- At the press conference in Beijing before World AIDS Day 2005, Chinese Minister of Health Gao Qiang stressed that although HIV/AIDS prevention and control is the responsibility of the Chinese government, the epidemic cannot be stemmed without effectively partnering with NGOs.³

- In a talk given at the Center for Strategic and International Studies (CSIS) in June 2005, Executive Vice Minister of Health Dr. Wang Longde acknowledged that while the government and the Chinese Center for Disease Control and Prevention (CDC) have been doing the bulk of intervention targeting high-risk populations, NGOs have a greater role to play besides technical support, including outreach and prevention education among “hard to reach” groups (CSIS, 2005).

Chinese officials are not just “talking the talk” when it comes to NGO involvement in HIV/AIDS

work. The central agencies are allocating and distributing funds to assist health NGOs to provide social services such as awareness education, support, and care. In 2005, the government committed 25 percent of the \$24 million budget from the “round four” project funded by the Global Fund to Fight AIDS, Tuberculosis, and Malaria to government-affiliated NGOs and grassroots NGOs. In July 2005, the Chinese CDC’s National STD and AIDS Center held a meeting with NGOs working with men who have sex with men. Officials discussed mechanisms to provide NGOs with 6 million Yuan in funding to conduct studies and prevention education among men having sex with men. Central and local health officials have begun to actively promote NGOs, including people living with HIV/AIDS (PLWHA) support groups in major cities and heavily impacted villages. The

BOX 1. Wan Yanhai and Beijing Aizhixing Health Education Institute

Aizhixing (*Love, Knowledge and Action*) Health Education Institute, led by a well-known AIDS activist Dr. Wan Yanhai, is one of the most experienced HIV/AIDS NGOs in China. Established in Beijing in 1994, Aizhixing today carries out programs in many regions of China, and recently began to support capacity building for other grassroots NGOs.¹ Currently, Aizhixing has four major program areas: legal aid to people living with HIV/AIDS (PLWHAs), AIDS education, policy advocacy, and NGO capacity building.

Legal Aid. Aizhixing has staff lawyers to provide free legal aid to people affected by HIV/AIDS. Aizhixing aspires to improve public awareness of laws in areas hard hit by the epidemic, encouraging affected individuals to use existing laws to fight for their rights. Dr. Wan hopes that enhanced local knowledge about legal tools will lead to increased government accountability. Aizhixing has focused much of its legal work in villages in central China with large numbers of HIV-positive villagers who became infected in the mid-1990s through unhygienic plasma donation practices.

AIDS Education. Aizhixing targets its education initiatives at disadvantaged groups, such as commercial sex workers, intravenous drug users, men who have sex with men (MSM), as well as the urban poor. Aizhixing distributes prevention education materials and condoms to sex workers in Beijing and northeastern China. With funding from the British government, Aizhixing has established six schools for the children of migrant workers in Beijing. Without

receiving sufficient education these children are more likely to turn to drugs or engage in commercial sex work to support themselves. The organization expects to expand the number of schools to 50 in 2006.

Policy Advocacy. Aizhixing seeks to improve government accountability and capability in HIV/AIDS prevention work through advocacy activities. Aizhixing actively lobbies the government to increase financial transparency and encourages the Ministry of Health to allocate appropriate funding to NGOs from government funds as well as resources provided by Global Fund and other international organizations. Additionally, Aizhixing attempts to strengthen nongovernmental efforts to monitor government activities. Dr. Wan points out that although advocacy work in the short term seems somewhat intangible, providing advocacy alongside tangible services to affected communities is imperative.

Capacity Building. Aizhixing has taken the lead to promote the growth of other grassroots HIV/AIDS groups by acting as a platform for information sharing and networking among various NGOs across the country. To date, Aizhixing has supported over 20 NGOs to conduct programs in the HIV/AIDS field, and expects to support more in the years to come.

NOTES

1. Authors’ interview with Dr. Wan Yanhai. (October 2005).

Ministry of Health's pragmatic response to NGO partnerships addressing HIV/AIDS is reminiscent of the approach taken by environment officials in the past to work with NGOs to mobilize communities and build support for their common goals.

Chinese HIV/AIDS NGOs Today

Much like the diversity displayed by green groups, Chinese HIV/AIDS NGOs operate under a variety of guises—registered social organizations, registered commercial enterprises and institutes, unregistered grassroots groups, self-help groups formed by PLWHA, and student groups. Among the 266,000 NGOs registered with the civil affairs administration, the total number of known health NGOs is still limited. Most HIV/AIDS groups based in Beijing and throughout urban communities and rural villages are very action-oriented and engage in numerous HIV/AIDS programs, with some servicing hard-to-reach marginalized groups by providing clean needles to injection drug users, condoms for sex workers, and health education for these affected populations and communities. Many NGOs deliver prevention and education messages to communities in both urban and rural areas, while others counsel at-risk and affected individuals in person or over telephone hotlines. Examples include a report released in late 2004 by the Beijing Gender Health Institute, which studied behavioral intervention methods targeting men who have sex with men. The Beijing Aizhixing Institute, led by the renowned AIDS activist Dr. Wan Yanhai, has developed into an organization that not only conducts prevention programs of its own, but also supports the growth of many other NGOs by providing funding and capacity building support. The Beijing Aizhixing Institute also has conducted extensive research and disseminated reports to keep both the general public and HIV/AIDS prevention practitioners informed on trends and treatment strategies in China, as well as providing material support to affected individuals. (See Box 1 for more details on this NGO).

These HIV/AIDS groups also conduct outreach to increase prevention knowledge and help affected persons access treatment, while others provide material support to affected communities, including donating clothes and supplies, financing education for orphans, and even initiating “pen pal clubs” for urban youth and students to correspond with affected children in villages. The scope of activities carried out by HIV/AIDS NGOs is

extremely broad, as illustrated by the groups profiled in Boxes 2 and 3.

Compared to green groups, these HIV/AIDS grassroots groups are still in their infancy and have relatively limited capacity. Organizations are often small, staffed with only one or two paid employees or relying entirely on volunteers. Tight budgets and limited capacity reduces the quality of output by many groups. Like green groups, HIV/AIDS NGOs also face difficulties obtaining consistent funding. Foreign funding is often short-term, making it difficult to mount long-term operations. Additionally, government wariness about international NGO funding—stemming from concerns about their political motivations has increased suspicions of Chinese groups receiving foreign funds. Local fundraising is limited by government regulations forbidding national appeals, while companies and wealthy individuals have little or no incentives to donate to independent NGOs, because they receive no tax breaks and potentially risk alienating government officials who encourage donations to their affiliated GONGOs.

Independent HIV/AIDS NGOs risk clashing with the government because they not only act as policy advocates, but are also service providers to affected communities. NGOs can face official opposition either because they essentially compete with government fee-for-service providers or because they seek to engage in activities the government considers illegal. Thus, organizations that distribute condoms to sex workers or clean needles to drug addicts risk sanctions from the public security authorities. Private organizations dispensing methadone to opiate addicts would be discouraged because they might compete with the growing number of government-owned clinics that charge fees to patients. Some AIDS activists in China have recently circulated various materials over the Internet that likely test the tolerance of government officials, such as non-violent civil disobedience manuals, similar to those produced by international NGOs. Other NGOs have supported HIV-positive individuals to petition the central government and agencies to claim compensation. These activities demonstrate how some AIDS groups are testing the limits of political activism, which other groups worry could potentially distract from the provision of services to those in need, and likely impact the operating environment for the entire sector.

BOX 2. Chengdu Gay Community Care Organization

Founded in 2002 by Mr. Wang Xiaodong and Mr. Jiang Hua, the Chengdu Gay Community Care Organization (CGCCO) is a regional NGO established and run by gay men in the capital city of Sichuan Province in southwest China.¹ Their stated mission is to:

Mobilize gay men to fight against AIDS on the basis of community; as well as combine concern and response to AIDS with improving the gay community's social image and status in China, so as to promote community development and social progress.²

Receiving financial support from the China-UK HIV/AIDS Prevention and Care Program (known simply as "China-UK") that ran from 2000 to 2006, CGCCO members have focused their efforts on outreach and education for the gay community and other stakeholders in Chengdu and other cities in China. They have incorporated innovative approaches and best practices from the United States and elsewhere to design and conduct activities that directly address the threat that HIV poses to the gay community in China.

Policy Advocacy

The organization's agenda includes policy advocacy, such as consulting and training government officials about the health needs of the gay community. In 2005, the group participated in the Sichuan provincial government seminar to develop the "Sichuan 2006-2010 AIDS Prevention and Treatment Plan," marking the first time that an NGO focusing on gay issues had been invited by the government to participate in an official planning meeting.

CGCCO has organized training for public health officials to sensitize them to the medical and psychological needs of gay men. In one instance, the group's trainers worked with a hospital in Chengdu to train staff

on medical issues related to STDs and other associated problems faced by sexually active gay men. A major component of the training focused on sensitivity training for doctors and hospital administrators to reduce stigma and judgmental attitudes and improve the overall quality of care for men who have sex with men (MSM).³ As part of the group's outreach program, they distribute referral cards that provide contact information for the trained doctors, the number to call for information and consulting, and directions to the hospital. In the six months following the training session, 110 men visited the doctors who were trained by the group.

Community Outreach

As a grassroots community-based organization, CGCCO is active in mobilizing the gay community, and conducting outreach and education activities. They operate a 24-hour hotline and publish a quarterly magazine distributing 9,000 copies in 20 cities nationwide. They have produced their own education materials including pamphlets that they distribute along with condoms in bars, on the street, and in outreach meetings. The group estimates that there are approximately 100,000 gay men in Chengdu, and make local outreach efforts their top priority. They estimate that through their efforts, they had reached 3,000 men in 2003, 4,000 in 2004, and 5,000 in 2005.

Locally, they mobilize and educate the gay community through activities in bars and on the street in areas where gay men congregate. They have 10 staff that supports the work of about 100 volunteers. They conduct training sessions for their volunteers twice a month, training them to train others. The group's fieldwork includes education and outreach to individuals

GREEN NGOS AND HEALTH NGOS: STAGGERED EMERGENCE, LINKED FUTURES

Making a Connection

The emergence of environmental and health NGOs in China share many characteristics. The leadership deliberately created space for both sectors to assist the government in responding to complex and pressing challenges that are threatening China's economy, political stability, and social welfare. Regardless of sector, the growth rate of NGOs

remains determined by the government, which perceives their role as complementing the government in its response to the country's crises.

Both NGO sectors also face a number of similar challenges. Being a fairly new phenomenon in China, capacity building is a major goal, including governance, management, and fundraising—as well as the skills to provide services and advocate on behalf of their constituents and stakeholders. To operate effectively, they need to be recognized and validated by the government, which will not tolerate opposition or dissent. Due to restrictions

in Chengdu, as well as mobilizing the gay community elsewhere in China through workshops and seminars. In 2005, CGCCO held a seminar to help others in the gay community to build their capacity to develop more grassroots organizations and NGOs.

Innovative Approaches to HIV Testing

The group has conducted innovative voluntary HIV & STD testing sessions with their peers. Calling their program “life companion education,” CGCCO has adapted principles used internationally to encourage gay men to recommend their partners get tested for HIV. The group convenes a social gathering of gay men in a casual setting, such as a teahouse (teahouses are a major part of Chengdu culture), to discuss safe sex behavior and distribute condoms. Gay men are encouraged to bring their friends and refer partners to the group. Those that engage in high-risk behavior are encouraged to have an HIV test on site.

Trained CGCCO staff draws blood samples at the teahouse, creates an identifier number that corresponds to the individual’s contact information to ensure privacy. The samples are tested at the Sichuan Provincial CDC and CGCCO is notified of the results. If an individual is HIV or STD positive, CGCCO staff members contact the person, inform them of the results and provide counseling on treatment options and HIV prevention. The psychological support provided by peers is considered to have a greater impact than the prescriptive (and sometimes judgmental) counseling provided by Chinese medical professionals who often lack a personal connection to the patient.

The cost of testing is not passed on to the individuals, but is covered by China-UK program grants provided to CGCCO. This community-based testing model is quite innovative in China, where HIV testing is most often confined to hospitals and clinics.

Future Challenges

Like most Chinese NGOs, access to funds is a major challenge and barrier to achieving the organization’s goals. CGCCO is registered as a company, not as a nonprofit organization, exposing it to significant tax liability on grants received. The lack of an effective NGO law that gives them tax-free status limits their effectiveness, because of the corporate tax burden and the fact the government is unable to give CGCCO grants to provide public health services to marginalized communities. The organization also has had little success raising funds from individuals or corporations, partly because the current income tax law does not encourage charitable giving or provide tax-deduction opportunities.

Fortunately, there is increasing awareness in China that the MSM population is at increased risk for HIV infection and therefore requires greater attention and resources. As the China-UK program winds down and approaches completion in 2006, new sources of funding from other international agencies will increasingly be available for prevention activities among MSM communities. With an established track record and strong reputation for work in the gay community, CGCCO will likely benefit from future grants that will enable them to carry on its mission to mobilize the gay community in the face of HIV/AIDS.

NOTES

1. Author’s interview with Wang Xiaodong, Director, Chengdu Gay Community Care Organization. (March 2005).
2. China HIV/AIDS Information Network (CHAIN). (Online). Available: <http://www.chain.net.cn/article.php?articleID=2294>.
3. While not all men who engage in sexual behaviors with other men identify themselves as “gay” or “homosexual,” the Chengdu Gay Community Care Organization emphasizes that they are “gay.”

under current law on the registration and management of social organizations—environmental and health NGOs both exist in various creative forms; both sectors have received significant international support, raising government suspicions. NGO activists are aware they operate in a dynamic political environment as government policy oscillates between support for NGOs that solve problems and alleviate social tensions and fear of grassroots movements that might ultimately challenge the Party. Survivability for an NGO requires the ability to “know which way the wind blows” in

order to operate within the boundaries of what is currently tolerated.

Looking Forward

Over the past 12 years, environmental groups have built up valuable experience and capacity that health NGOs can draw upon. Besides carving political space for other NGOs and building up their credentials as partners with the government, ENGOs can offer capacity building assistance to health NGOs. Many health NGOs are likely to succeed over the long-term by following the model pioneered by green

NGOs; complementing the government and avoiding sensitive political issues; mobilizing society; and providing services in a non-confrontational and non-competitive way. Health NGOs are now mobilizing a general public that is more aware of public participation and volunteerism, notions instilled by pioneering green NGOs. Despite many challenges along the way, health NGOs are already establishing the capacity to push a second wave of civil society development in China. A third wave could be the joining of these two sectors to address growing environmental health problems.

The accidental discharge of tons of life-threatening chemicals into the Songhua River in November 2005 vividly illustrates the threats posed to health by poor environmental controls. Local authorities' attempts to cover up the spill and control media coverage of the event were met with public outrage. The news media responded by openly speculating that the cause of the water stoppage in Harbin was the upstream factory explosion and subsequently reporting details of the government response, forcing a certain level of government accountability. While the Harbin disaster was an "acute" one, the long-term health effects of pollution are significant in China, contributing to increases in early death, birth defects, and "cancer hotspots," particularly in rural areas where clusters of certain cancers are more prevalent than the rest of the country. Pollution, which is directly attributed to declining levels of health in many communities, is increasingly a cause of civil unrest, sparking spontaneous mass-mobilization of pollution victims. While this type of grassroots activism has not yet fostered a sustained environmental-health NGO sector, it is an indicator of the forces that could drive activism and advocacy surrounding the nexus of environmental degradation and health. As an inherently grassroots issue, the sector is primed for growing civil society participation.

Looking forward, the future of environment and health NGOs in China is inextricably linked. The political space each sector carves out and expands ultimately benefits civil society. The government at all levels will remain wary of unchecked expansion of civil society groups regardless of their positive contributions. As an increasing number of health NGOs joins green groups in a non-confrontational effort to

BOX 3. Guangzhou Beautiful Life Training Center

Beautiful Life (*Meili Rensheng*) Training Center is a very small but novel NGO, operating in the Pearl River Delta. Founded by Mr. Wu Qinghua several years ago, the center is registered as an affiliated organization of the Guangzhou Academy of Social Science and has two full-time staff. Mr. Wu has drawn support for the center's activities from local manufacturing enterprises in the Pearl River Delta area, including condom manufacturers. This example of indigenous corporate social responsibility is exceptional in China, and cause for optimism to see Chinese enterprises that have benefited from economic growth over the past 25 years growing aware of opportunities to support grassroots NGOs that provide services to vulnerable or less-developed communities. With a very limited budget, the center conducts two innovative programs focusing on the HIV/AIDS epidemic and migrant workers.

AIDS Awareness Education Program for Migrant Workers in Guangzhou. The center offers HIV/AIDS life skills training, free counseling, and distributes information posters in communities where many migrant workers reside in Guangzhou. Targeting the "floating population" as migrants are often called in the Pearl River Delta area, this program is a grassroots effort to improve HIV/AIDS awareness among large numbers of rural citizens who come to work in Guangzhou.

Thousand Village Program (*Qian Cun Xing*). Each year, universities in the Guangzhou area enroll students from across the country, a large number of whom are poor students from the countryside. It is often the case that these students cannot afford transportation fares back home during school vacations. The center developed the *Qian Cun Xing* program to mobilize these students to become volunteer HIV/AIDS educators, and subsequently sponsor their trips home. The center offers to pay for students' train tickets under the condition that once they return to their home villages during school vacation, they will conduct HIV/AIDS awareness training for local villagers and distribute suitable education materials. This outreach approach is designed not only to educate college students about HIV/AIDS, but also to capture rural youth before they engage in high-risk activities, particularly before they leave home in search of work in urban areas. The *Qian Cun Xing* program was initiated in 2004, and to date has reached over 100 villages across the country. The goal is to eventually cover 1,000 villages.

better their communities, the political climate could improve, allowing more organizations to engage in a broader range of activities. It is instructive to reflect on recent crackdowns and also consider possible scenarios of how the sector could develop.

While Chinese labor activists have long been subject to persecution, there are indications that ENGOs may increasingly be the subject of greater scrutiny. For example, the Yunnan provincial government has pressured a local NGO that was educating villagers in the Nujiang basin on the potential threats dams could pose for their livelihood (Nijhuis, 2006). In another case an NGO leader was arrested in Zhejiang for monitoring the protest activities of a community demanding the closure of an industrial park (Buckley, 2005). While the “bottom-up” push by grassroots groups is not always candidly opposed by authorities, such actions are often held in suspicion. After NGOs opened the Nujiang dam debate and effectively caused planning to halt in February 2005, a new EIA was completed. ENGOs have pushed the government to disclose the new EIA—as is required by law—but the report has been deemed a state secret. International pressure has begun to build over these planned dams, bolstering domestic green activists to maintain their demand for publication of the EIA. While this issue continues to fester, it remains a litmus test of government accountability and its willingness to include the public in decision-making processes. Barring an unexpected shift in government approaches towards transparency, governance, and civil society in general, NGOs will continue to operate in this somewhat ambiguous paradigm. As such, the long-term future of civil society and NGO development is far from certain.

Speculation about the Future:

The Good, The Bad, and The Ugly

The Good. Assuming NGOs continue work alongside the government and do not directly oppose the government-defined status quo or involve themselves in sensitive political areas—such as advocating for democratic or legal reforms that challenge the Party—the outlook for civil society expansion is positive. The current environment of tightened control of NGO registrations and activities, particularly foreign-funded NGOs, can potentially be eased as the government is reassured of their positive role in the nation’s response to pressing environment and health challenges. As more local governments see positive results, NGOs will increasingly be perceived as valued local partners who deliver public

benefits and contribute to social and economic development. The government has placed greater stress on fostering “harmonious development” by stating their intention to increase government funding for education, health, and the environment in the new Eleventh Five-Year Plan. Alignment of government interests with the goals of NGOs will further support development of civil society and the role of the private sector in the provision of public goods that the government is no longer able to effectively provide. Additionally, deepening cooperation between the government and the private sector at all levels can potentially improve effective governance—particularly transparency, and accountability—creating a virtuous cycle that ultimately contributes to the government’s desire for more stable development.

The Bad. In an extremely bleak scenario, the inherent confrontation between the state and private sector would be realized, especially as the one-party Chinese political system lacks effective checks and balances on power. NGOs often chafe under the authority of a government reluctant to cede authority or responsibility for public services that it cannot effectively deliver due to insufficient capacity or corruption. Government departments, particularly at local levels perceive NGOs—particularly in the health sector—as competitors for delivery of fee-for-service programs and react by suppressing the private sector actors. When the interests of the public and private sectors diverge, the government is most likely to lose faith in civil society’s ability to operate in a constructive and non-threatening manner. NGOs’ reliance on foreign funding in the absence of domestic support fuels government suspicion, prompting fears that NGOs are subversives, attempting to undermine the government through western-supported “peaceful evolution” (*hepingyanbian*). Increased tension and suspicion lead to more restrictive policies that limit registration, membership, fundraising and permissible activities, effectively making existing NGOs insignificant and preventing expansion of civil society.

The Ugly. As noted above, the future of environmental and health NGOs are interlinked, which poses potential risks. Contentious behaviors of “outliers” can be interpreted by the government as reflections of the core of civil society. For example, if a critical mass of NGOs in one or both sectors engages in political activities the government considers threatening, the political reaction would be felt across all sectors. Because both health and environmental issues directly affect individuals

and communities, NGOs can find themselves in situations that place them in opposition to government officials, such as representing the interests of affected groups by organizing individuals to seek redress from the government or government supported enterprises. Other NGOs might engage in activities that directly seek government accountability for environmental or health crises, causing a backlash from officials. While only a certain number of organizations might engage in activities that directly threaten the government, contradictions could potentially lead to troubling events, such as increased civil unrest, which would likely result in a crackdown against all NGOs. Certainly, some organizations already engage in activities similar to those mentioned here without significant reaction from authorities, indicating two things; the “envelope” for NGOs is being stretched, and a threshold volume of such activities has not yet been reached. If enough NGOs are perceived to be in open opposition to the government, the response is likely to significantly rollback the operating freedoms that have developed over the past 12 years.

CONCLUSION

Overall, environment and health NGOs in China have largely avoided direct confrontation with government and focused on their core missions, thereby establishing a positive operating environment. While there are few indications this relationship will decline, as the operating environment improves and NGOs are given more freedom to operate, it is possible individuals will gain a false sense of security and push to the point where the government begins to push back. The social and economic systems in China have been in a constant and dramatic state of change for the past 25 years, outpacing changes in political systems, leaving the government ill-equipped to single-handedly address environment and health challenges, such as HIV/AIDS. It is unimaginable at this point that the Chinese government will wholeheartedly embrace civil society in the foreseeable future. However, trends are generally positive, so long as NGOs focus on delivering positive outputs and build constructive relationships with government. These relationships will mitigate the affects of “outlier” organizations seeking to directly challenge the government, and could potentially even increase appreciation for NGOs that abide by the unwritten rules. As the private

sector in general, and NGOs in particular play a growing role in society, albeit in the shadow of a dominant government, they increase the likelihood that NGOs will become an indispensable factor in Chinese society, and affect positive changes within government such as increased accountability and transparency. How the tension between the government’s desire to maintain the status quo dominating the economy and society and the NGOs’ attempts to change the fundamental political causes of environmental degradation and poor public health is resolved, ultimately will define the future of civil society in China.

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REFERENCES

Buckley, Lila. (November, 2005). “Environmental Activist Arrested in Hangzhou; Movement Still Hampered by Legal and Financial Restrictions.” China Watch. [Online]. Available: <http://www.worldwatch.org/node/134>.

Center for Strategic and International Studies (CSIS). (2005). Transcript of CSIS Roundtable Discussion on HIV/AIDS policies on June 6, 2005. (Online). Available: http://www.csis.org/media/csis/events/050606_longde.pdf.

“Chinese Environmental NGOs Survey Report.” (May 10, 2006). [Online]. Available: <http://www.ngocn.org/Article/ShowArticle.asp?ArticleID=1714>. (In Chinese).

Economy, Elizabeth. (February 7, 2005). *Environmental NGOs in China: Encouraging Action and Addressing Public Grievances*. Testimony before the Congressional-Executive Committee on China.

Economy, Elizabeth. (November 27, 2005). “The Lessons of Harbin.” *Time Asia*.

Gao Qiang. (July 1, 2005). “Developing Public Health to Contribute to the Establishment of Socialist Harmonious Society.” [Online]. Available: <http://finance.sina.com.cn/chanjing/b/20050803/20511860621.shtml>.

Ma, Xiaoying & Ortolano, Leonard. (2000). *Environmental Regulation in China: Institutions, Enforcement and Compliance*. Lanham: Rowman & Littlefield.

Nijhuis, Michelle. (2006). “It had to be Yu. In China, Yu Xiaogang is helping locals fight back against dams. [Online]. Available: <http://www.grist.org/news/maindish/2006/04/25/nijhuis-yu>

PRC Ministry of Health, UNAIDS and World Health Organization. (January 24, 2006). *2005 Update on the HIV/AIDS Epidemic and Response in China*. Beijing.

Schwartz, Jonathan. (2004). “Environmental NGOs in China: Roles and Limits”. *Pacific Affairs*, Spring.

Thompson, Drew. (2005). *China Confronts AIDS*. Washington, D.C.: Population Reference Bureau.

UNAIDS. (2004). *Epidemiological Fact Sheets on HIV/AIDS and Sexually Transmitted Infections, 2004 Update China*. Beijing.

Wolf, Charles, et al. (2003). *Fault Lines in China's Economic Terrain*. Washington, D.C.: RAND Corporation.

Yongding. (October 2005). “China's Color-Coded Crackdown.” *Foreign Policy*.

Young, Nick. (September 2005). “Under Scrutiny, NGOs Should Relax and Put Their Case Patiently.” *China Development Brief*, Volume IX, Number 7.

NOTES

1. Note, “Men who have sex with men” refers to men who engage in sexual behaviors with other men, but who may not identify themselves as “gay” or “homosexual.”

2. Speech by Vice Premier Wu Yi at the opening ceremony of the GBC's Joint Summit on Business and AIDS in China. (March 18, 2005).

3. State Council Press Release Conference, Gao Qiang on HIV/AIDS Prevention and Control. (November 30, 2005).

金木水火土

FEATURE BOX

The China Environmental Health Project

Millions of rural citizens in southwest China suffer from health problems and limits to economic development that result from air pollution from coal and face inadequate drinking water supplies due to that region's karst geology, where much of the water flows underground through caves rather than at the surface. These health problems are yet another burden on tens of millions of subsistence farmers who live below China's poverty threshold of \$85 per year. For 15 years, scientists at Western Kentucky University (WKU)—together with Chinese university counterparts and a number of U.S. government agencies and other organizations—have been undertaking applied research and training projects focused on enhancing Chinese infrastructure and technical capacity with regard to monitoring emissions from coal burning and finding solutions to safe drinking water challenges in southwest China's limestone karst regions.

In October 2006 these research efforts coalesced into the CHINA ENVIRONMENTAL HEALTH PROJECT, with major support from the U.S. Agency for International Development and matching funds from partner organizations. The project is led by WKU's Hoffman Environmental Research Institute and Institute for Combustion Science and Environmental Technology and will be carried out in partnership with the China Environment Forum (CEF) at the Woodrow Wilson Center, the International Institute for Rural Reconstruction (IIRR), as well as with Chinese scientists from the School of Geography at Southwest University of China near Chongqing and the Anhui University of Science and Technology in Huainan. The main focus of the collaborative project is university partnering to enhance technical infrastructure in air quality analysis, hydrogeology, and Geographic Information Systems computer



A woman carries water from a karst spring near the village of Yaji in the Guangxi Autonomous Region. Millions of people must carry their water supplies by hand in China's southwest karst region and many of these springs are contaminated by bacteria and pesticides. © Chris Groves.

mapping technology. The water component will utilize on-the-ground demonstration projects in Chongqing and Yunnan to serve as a training vehicle while providing direct benefit in water supply and quality to residents in the areas of the projects. The coal component will focus on increasing air quality monitoring capacity in Huainan and on implementing health impact studies in the city. At each project site CEF and IIRR will be carrying out community outreach and education work to bring citizen input into the research projects. Subsequent issues of the *China Environment Series* will feature updates of the China Environmental Health Project's activities. The Hoffman Institute (<http://hoffman.wku.edu>) and CEF (www.wilsoncenter.org/cef) webpages will also be posting project information and information on environmental health issues in China.

FEATURE ARTICLE

Reducing China's Thirst for Foreign Oil: Moving Towards a Less Oil-Dependent Road Transport System

By Hongyan He Oliver

China's oil demand is likely to continue increasing in the next two decades, mainly driven by its rapidly growing vehicle fleet, particularly, personal cars. Developing a less oil-dependent transport system is critical in reducing China's thirst for foreign oil and in improving air quality in the country's hazy cities. A range of policy options and strategies can be utilized to encourage cleaner vehicle technologies and fuels. Compulsory fuel economy standards are essential to push automobile manufacturers to provide efficient vehicles. Moreover, fiscal policies such as fuel economy vehicle fees and high fuel taxes could encourage Chinese consumers to purchase efficient vehicles and drive less. From the fuel supply perspective, biofuels and coal-to-liquids could help mitigate China's concern for its oil security in the interim. Most importantly, less energy and land-intensive travel options must be provided as alternatives to personal cars to meet the increasing mobility demand in China's ongoing urbanization process. Because China and the United States have high demands for imported oil and face similar risks from high oil prices, they both should take responsibility in stabilizing the international oil price. These two largest oil-consuming countries could help to enhance their energy security and control their petroleum hunger by communicating and cooperating with each other in developing and demonstrating clean and efficient vehicle technologies, substituting oil-based fuels with alternative fuels, and promoting integrated urban planning with an emphasis on maximizing overall transportation energy efficiency.

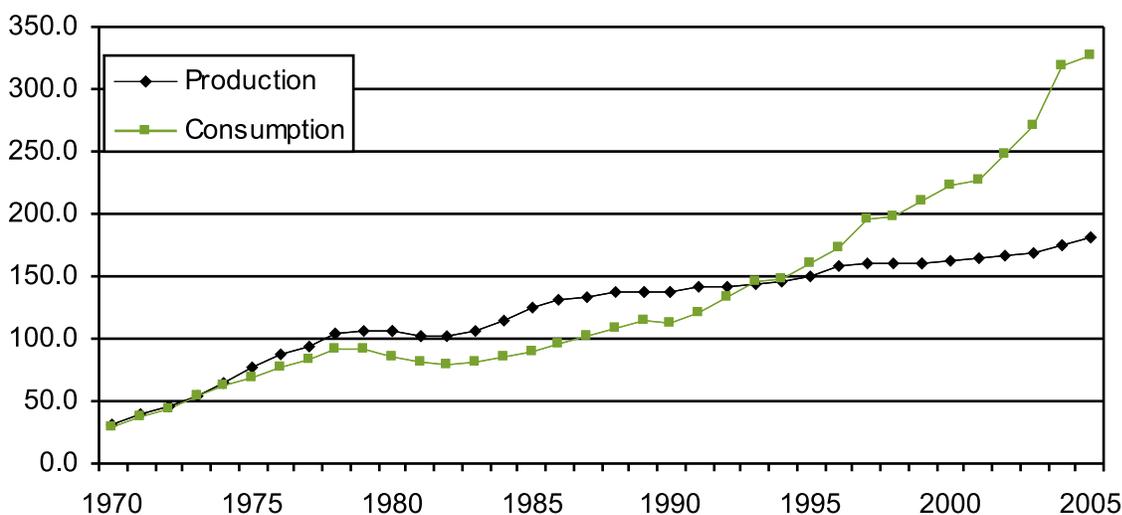
Over the past few years, significant concern has arisen over the increase in China's energy appetite and its implications for the global and U.S. energy markets ("A hungry dragon," 2004; Romero, 2004; Zweig & Bi, 2005). The attempt by China National Offshore Oil Corporation (CNOOC) to procure Unocal, the ninth largest U.S. oil company, attracted much negative attention from Congress and the news media (Kahn, 2005). CNOOC eventually withdrew its \$18.5 billion bid due to the strong objection of members of Congress. This collision brought into sharp focus the uneasy feeling in the United States towards China's growing appetite for global resources, particularly oil for energy.

China's energy consumption has increased considerably over the past twenty-five years. Its total energy consumption in 2005 was about 2.7 times more than that in 1980 (British Petroleum, 2006).¹ In particular, its oil consumption increased by 2.8 times over the same period, accounting for about 21 percent of total primary energy consumption

(British Petroleum, 2006).² In 2003, China overtook Japan to become the second largest oil consumer in the world, following the United States (Energy Information Administration [EIA], 2005a). Fourteen years after China became a net oil importer in 1993, its dependence on foreign oil reached 45 percent in 2005 (see Figure 1). According to the EIA (2005a), China alone accounted for one-third of global oil demand growth from 2001 to 2004. Although its total oil imports accounted only for 6.6 percent of the total global oil trade in 2004, China has borne the brunt of accusations for being the cause of soaring oil prices in the last few years ("China oil demand," 2005; Hoyos, 2004). This growing hunger for oil has been driven mainly by three factors:³

- (1) Increasing demand for personal mobility and goods transport;
- (2) The growing chemical industry that relies on petroleum products (in particular, ethane) as feedstock; and,

FIGURE 1: China's Oil Production and Consumption (1975-2005)



Source: British Petroleum (2006). *BP Statistics Review of World Energy 2006*

(3) The use of oil-fired power generators as short-term solutions to provide needed electricity on-site when there is a national or regional electricity shortage.

Among the three factors, it is estimated that increasing demand for fuel from road transport will continue to be the major force driving China's growing hunger for foreign oil. Currently, road transport accounts for one-third of China's total oil demand, and the number is likely to reach about 65 percent by 2010, if annual automobile sales grow to 8 to 9 million per year, as predicted by many experts.⁴

Table 1 presents projections of China's oil demand and supply. While there are significant

differences between the estimated projections, all agree that Chinese demand will continue to far outstrip the supply, and in fact domestic production will likely plateau or drop. According to the *China Energy Development Report 2003*, by the end of 2002, China had extracted 3.97 billion tons of oil, and its total remaining proven reserve was about 2.4 billion tons. Oilfields in the eastern region, such as Daqing and Shengli have been exploited for decades and their production has plateaued, or has been decreasing. Although output from oilfields in western China and offshore are gradually picking up, these increases are unlikely to offset the production decline of mature oilfields in eastern China.

TABLE 1: China Oil Demand and Supply Projections (Million Tons Per Year)

	2010	2015	2020	2025	2030
Demand Projections					
IEA (2004)	375		503		636
EIA (2006a)	450	540	660	780	920
China Energy Development Report (2003)	310	350	400		
Supply Projections					
IEA (2004)	168		137		112
EIA (2006a)	172	167	162	162	167
China Energy Development Report (2003)	170-190	180-200	170-190		

Note: IEA source is *World Energy Outlook 2004* (reference scenario, China's annual oil demand grows 3.6% from 2002 to 2030); EIA source is *International Energy Outlook 2006* (reference scenario, China's oil demand grows 4.5% annually on average from 2003 to 2025).

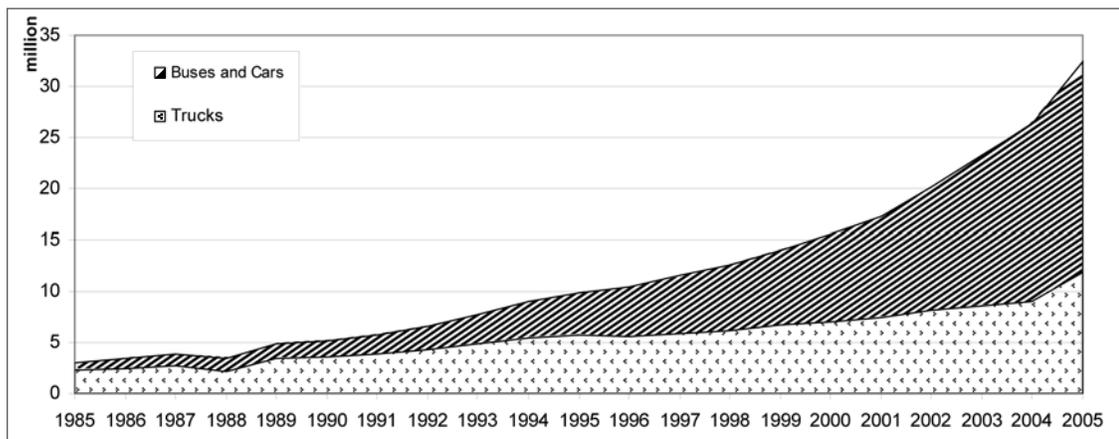
This scenario has resulted in unease not just within China, but also among major global oil importers, particularly the United States and Japan. To a significant extent, China's foreign policy in recent years has been influenced by its need for foreign oil (Downs, 2004; Lieberthal & Herberg, 2006). With a strong preference for energy self-reliance, China's leaders are concerned about the uncertainties of price and availability related to acquiring hundreds of millions of tons of oil from world markets. International oil supply can be interrupted by political instability of major oil supplying countries, and major natural disasters like Hurricane Katrina. What makes the Chinese leaders even more uncomfortable is the country's heavy reliance on foreign vessels to transport its oil from the Middle East (45 percent of China's imported oil in 2004) and Africa (29 percent in 2004). China notably lacks naval capacity to protect oil cargo on the high seas and to patrol the Strait of Malacca, through which four-fifths of its oil imports pass (Jaffe & Medlock III, 2005; Lieberthal & Herberg, 2006; Berger, 2005). Meanwhile, soaring oil prices bring additional costs to China's economy and likely make its manufactured goods less competitive. In addition, Chinese international relations experts commonly anticipate

a possible oil embargo by the United States and its allies, if China enters a severe confrontation with them (Cao, 2005; Zha, 2005; Zweig & Bi, 2005).

Because oil is such a critical energy source, China (like many other countries) has devoted considerable efforts to address its oil security. China's diverse strategy to promote oil security include: (1) diversifying international sources of supply; (2) reducing total imports by improving energy efficiency; (3) boosting domestic supply and substitute fuels; (4) building up a strategic oil reserve (not in existence yet); and (5) establishing cooperative relations with major oil importing and producing countries.

Growing media attention on China's expanding oil search often focuses on the threat it poses to global oil markets. In contrast, this paper discusses domestic steps that China could take in the transportation sector to reduce its dependence on foreign oil. The remainder of this paper compares international and Chinese practices in addressing the conflicts between increasing transportation needs and issues such as oil security, congestion, and urban air quality. The paper concludes with a discussion on possible areas of cooperation between China and the United States to address their respective oil dependence.

FIGURE 2: Registered Vehicle Population in China (1985-2005)



Note: In the Chinese statistics, buses and personal vehicles are lumped together counted as passenger vehicles.
Source: China Automotive Technology and Research Center (2006a, 2006b).

ENERGY DEMAND BY CHINA'S GROWING VEHICLE FLEET

Until a couple of decades ago, foreigners visiting China were impressed by the sea of bicycles in cities. Gradually, bicycles have given way to a wide

array of vehicles. Studies of trip shares taken by residents in Shanghai, Wuhan, and Xi'an show a rising (although still small) share of private vehicles for trips, and falling trends for non-motorized modes (Schipper & Ng, 2004).⁵

The Chinese leadership determined in the early 1990s to promote the automobile industry as a “pillar” industry in order to propel the country’s economic growth. Realizing China’s lack of indigenous automobile technical capacity, central decision-makers opened the sector to international investment and welcomed foreign automakers to form joint-ventures with Chinese auto companies (Gallagher, 2003). At the same time, China’s growing economy was demanding more transportation services for both goods and people, and a rising middle class has led to growing demand for personal vehicles. Consequently, the vehicle population in China has shot up dramatically, especially after the mid-1990s. (See Figure 2). China’s total vehicle population amounted to about 33 million at the end of 2005, its level of motorization is extremely low in comparison to industrialized countries (China Automotive, 2006a, 2006b).⁶ In 2005, there were about 25 vehicles per thousand people in China; in contrast, the corresponding number was about 800 in the United States, 580 in Japan, and 300 in South Korea.

A joint report by the China Academy of Engineering and the U.S. National Research Council (2003)—*Personal Cars and China*—developed three scenarios for China’s future vehicle population. The study assumes that China’s vehicle fleet will grow at the same pace as its national economy in the next two decades. It predicts that by 2020, China’s total vehicle population will reach 80 or 110 million if its annual economic growth is 8 or 10 percent, respectively.⁷ Notably, actual vehicle sales in China have grown much faster than the increase in its national income in the past few years. There were almost 6 million more vehicles in use in China than the anticipated number under the joint study’s high-growth scenario for 2005.

Among the three categories of motor vehicles (trucks, buses, and cars), sales of cars have grown most rapidly. Trucks used to dominate the vehicle market until 2002, when total sales of cars surpassed that of trucks, reaching 1.13 million. 2002 and 2003 witnessed 57 and 77 percent boost in car sales. The share of cars in total vehicle sales reached nearly 70

BOX 1. Safety and Environmental Ramifications of the Growing Vehicle Population in China

Traffic safety has become a major concern accompanying vehicle population growth in China. Road accidents reported to the communications and public security bureaus almost tripled from 1991 to 2002. The number of reported accidents hit historical high of nearly 800,000 in 2002. According to the *Automotive Industry of China 2005*, the annual number of traffic fatalities almost doubled during the same period, from 53,000 to 100,000. In 2004, the total number of deaths due to traffic accidents in China was just under 80,000, almost twice as much as those in the United States.¹

Besides the cost of accidents, the growing vehicle population has become a major contributor to urban air pollution, particularly in China’s four megacities—Beijing, Shanghai, Guangzhou, and Shenzhen, which together account for about 20 percent of the country’s total fleet. Beijing alone has about one-eighth of China’s vehicles (2.7 million vehicles were registered in Beijing as of spring 2006 and over 1,000 new vehicles are added to Beijing’s fleet each day). In the late 1990s, vehicle emissions in Beijing contributed to 46, 78, and 83 percent of total NO_x, HC, and CO emissions, respectively, as well as 68 percent of ambient NO_x and 77 percent of CO concentrations (Fu, 2000; Hao, 2001). Vehicle emissions are also a significant source of airborne particulates (PM₁₀, particles with aerodynamic diameter no more than 10 microns), especially fine particles (PM_{2.5}, particles with diameter less than 2.5 microns), which can deposit deeply in lungs and causes serious health effects, such as asthmas attacks, worsening lung diseases, and heart damage. Annual PM₁₀ concentration in Beijing was 50 percent higher than the Chinese standard (which is only half as strict as the U.S. current standard, which permits only 50 micrograms per cubic meter of air (ug/m³)—a standard the U.S. EPA has been pushing to significantly tighten). Although PM_{2.5} is more detrimental to human health, China has not yet established standards for ambient PM_{2.5} concentrations. In addition, ground-level ozone concentrations in Beijing are frequently higher than the Chinese national standard; 67 days and 285 hours of ozone concentration violations were recorded by Beijing EPB in the summer and fall of 2004.

NOTE

1. <http://www-fars.nhtsa.dot.gov/main.cfm>

percent in 2005, and it is likely to continue rising in the near future (China Automotive, 2006a, 2006b).

There is no doubt that increased motorization is bringing significant benefits to Chinese society, such as economic growth resulting from the burgeoning auto industry, enhanced exchange and flow of labor and goods, and improved social welfare and personal freedom from increased mobility. However, increased motorization has tremendous ramifications for energy demand and security, infrastructure capacity, urban traffic management, environmental impacts, and traffic safety. (See Box 1).

It is very difficult to accurately estimate future oil demand for transportation in an emerging economy like China. Oil demand by road transport depends on the size of vehicle population, average mileage driven per year, and the fleet fuel efficiency. All three variables depend on various other factors, such as China's economy, fleet composition, infrastructure capacity, availability of alternative travel modes, and policies on energy, environment, and transportation. Despite uncertainties related to these factors, much can be done to reduce China's oil demand from road transport. The next section examines Chinese fuel economy standards and adoption of technologies that can improve fuel economy.

STANDARDS AND TECHNOLOGIES FOR BETTER FUEL ECONOMY

Experts have looked at the potential effects of a more efficient fleet on Chinese oil consumption. For example, He et al. (2005) assumed three different scenarios for the Chinese fleet fuel economy from 2002 to 2030:

(1) *No improvement.* New vehicles maintain the same fuel economy as the average during the 1997-2002 period;

(2) *Moderate improvement.* New vehicles are required to improve their fuel efficiency by 20 percent by 2008 and an additional 20 percent by 2018; and,

(3) *High improvement.* New vehicles are required to improve their fuel efficiency by 30 percent by 2007 and an additional 40 percent by 2017.

He (2005) concluded that if China adopts the stringent vehicle fuel economy requirements under the high improvement scenario, the total oil demand by road transport in China would be about 40 million tons less than the no improvement scenario

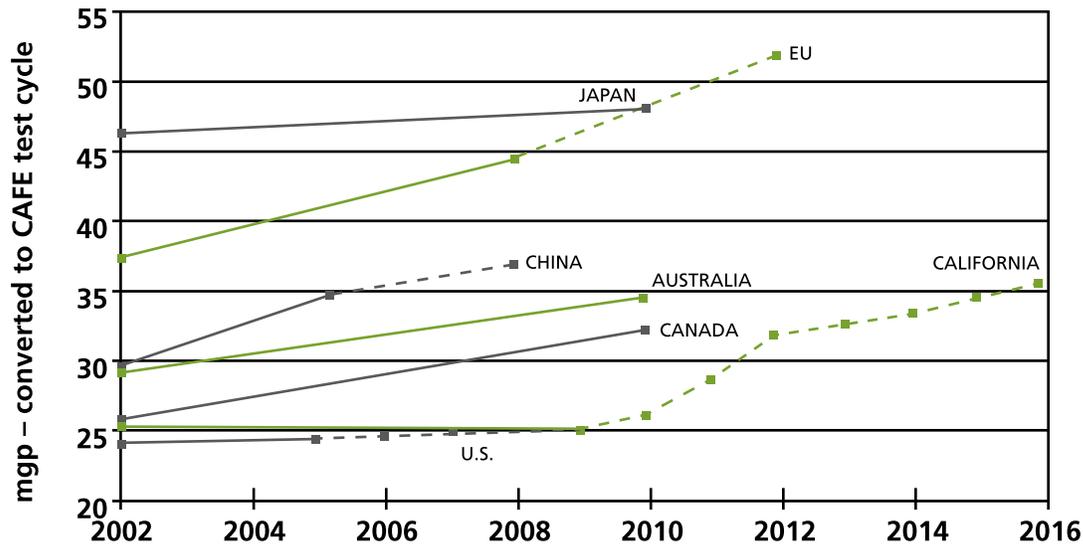
by 2020, and about 90 million tons less by 2030.⁸ Reaching these goals remains challenging considering the current low level of fuel efficiency in China and obstacles to strong standards or fiscal policies to push such a technology switch.

Fuel Efficiency Standards

The fuel efficiency of most Chinese in-use vehicles is worse than that of comparable ones in the industrialized countries (China Academy of Engineering & National Research Council, 2003). To encourage foreign companies to bring fuel-efficient technologies to the Chinese market, the central government issued fuel efficiency standards in October 2004; the standards are applicable to cars, SUVs, and multi-purpose vans weighing less than 3,500 kg (7,700 pounds). Following the Japanese model, Chinese fuel efficiency requirements vary according to vehicle weight category and transmission type. In contrast to the U.S. Corporate Average Fuel Economy (CAFE) standard, which is based on fleet average, the Chinese standards require each individual vehicle model to meet the standard for its weight class. To discourage automobile manufacturers from producing inefficient heavy passenger vehicles, the standards for heavier weight classes (>2,110 kg) are relatively more stringent than those for lighter weight classes.⁹ China's new standards are to be implemented in two phases: new vehicle models were required to meet their respective Phase I standards by 1 July 2005, and Phase II standards by 1 January 2008.¹⁰ For the same weight class vehicles, Phase II standards are about 10 to 13 percent stricter than Phase I standards.

An and Saucer (2004) compared fuel economy standards of selected countries (see Figure 3), which showed that the average fuel economy of light-duty vehicles (LDV) sold in China in 2002 was about 29.4 miles per gallon (mpg)—better than that of LDVs sold in both the United States (24.1 mpg) and Canada (25.6 mpg). This is because most passenger vehicles sold in China have much smaller engines and weigh less than those sold in North America. Even with the Phase II fuel economy standards, the fleet fuel economy of new LDVs in China will still be far behind the EU (37.2 mpg) and Japan (46.3 mpg) in the next ten years. To catch up with Europe and Japan, China will need to tighten its fuel economy standards further and push automobile manufacturers to employ advanced technologies on vehicles sold in the Chinese market.

FIGURE 3: Comparison of Fuel Economy Standards across Countries



Note: Dotted lines represent proposed standards. Only passenger vehicles are included in the comparison.
Source: An and Sauer (2004).

New Technologies

Many countries have taken actions in developing and deploying advanced vehicle technologies that can lead to better fuel economy; helping to meet the challenges of increasing fuel prices, national energy security, and environmental impacts associated with vehicle use. The adoption of such technologies has resulted in substantial improvement of fuel economy in most OECD countries, especially in the early-to-mid 1980s.¹¹ Since the mid-1990s, commitments to reduce greenhouse gas emissions led to wide adoption of advanced fuel-efficient vehicle technologies in Europe and Japan, but not much in North America and Australia. Table 2 summarizes various technologies (grouped into seven categories) that can improve fuel economy.

Most vehicles produced in China are based on models initially sold in industrial countries. Before the mid-1990s, only a handful of vehicle models were produced in China, and the employed technologies were about ten years behind those in Europe and the United States. Since the late 1990s, lured by the rapidly growing Chinese automobile market, major international vehicle manufacturers established joint ventures to produce their brands in China. The intensified competition provoked these manufacturers to bring in more contemporary models. Common technologies for fuel efficiency adopted

in these countries (e.g., technologies related to drag and rolling resistance reduction and computer-controlled electronic spark ignition and transmission) and those for emissions control (e.g., three-way catalytic converters) are widely employed on vehicles produced in China. However, more advanced engine and transmission technologies for greater fuel efficiency, which are still in the early adoption process in the west, (such as cylinder cut-out, gasoline direct injection, and continuously variable transmissions) have rarely been brought to China because of their high costs. It seems the fuel efficiency standard of most automobile models that international companies bring to produce in China is comparable to that of their equivalent foreign models (Gallagher, 2005; Bradsher, 2006). Nevertheless, models developed by Chinese automakers themselves still consume 10 to 30 percent more energy than those made by foreign technologies and design (Gan, 2003).

Hybrid Systems

As shown in Table 2, significant fuel economy gains can be obtained through hybrid technologies, and a full hybrid system can lead to a 30 to 50 percent increase in fuel efficiency.¹² Following Toyota and Honda, two U.S. companies—Ford and GM—have also applied hybrid technologies to some of their models. As of mid-2006, 6 car, 5

TABLE 2: Technologies for Improving Vehicle Fuel Efficiency

<i>Approach to improve fuel efficiency</i>	<i>Technology</i>	<i>Tested fuel efficiency benefit (%)</i>
Reducing tractive force requirement	Weight reduction (5-10%)	3.5 to 7
	Drag reduction (10-20%)	2 to 4
	Rolling resistance	2 to 4
Improving engine efficiency	Engine downsizing & increase specific output	1 to 2
	Variable valve timing	1.5 to 2.5
	Variable valve lift and timing	5 to 7
	Cylinder cut-out	6 to 8
	DI diesel engines	35 to 40
	Gasoline direct injection	12 to 15
	Electronic fuel injection	1 to 2
Improving transmission efficiency	6-/5- speed automatic	2.5 to 5
	Continuously variable transmission	5 to 7
	Electronic transmission control	1 to 2
Hybrid technology	Mild-hybrid (42 V)	5 to 7
	Full hybrid	30 to 50
Reducing internal frictions	Engine friction reduction	2 to 4
	Fuel efficient lubricant (5W-20 oil)	0.5 to 1
Reducing power consumption by accessories		0.5-2.5
Fuel-saving driver support devices		10-20

Source: European Conference of Ministers of Transport and International Energy Agency (2005).

SUV and 2 pick-up truck models in the U.S. market are equipped with hybrid technologies. In contrast, the only hybrid automobile model available in China is Toyota's Prius. To demonstrate its intention to bring its best technologies to China, Toyota decided to produce 3,000 Prius cars each year for the Chinese market at its joint venture with the First Auto Works in Changchun. The Prius cars assembled in China are priced between 288,000 and 302,000 Yuan (\$36,000 and \$37,750)—considerably higher than what ordinary Chinese consumers can afford. In hopes of developing domestic hybrid vehicles, the Ministry of Science and Technology (MoST) organized major Chinese automakers to conduct R&D on hybrid technologies. As of mid-2006, Chinese automakers and research institutes have made more advances in hybrid buses than hybrid cars. For instance, six prototype hybrid buses developed by Dongfeng Motor Corporation have been in service around Wuhan since 2002; and the company plans to commercialize its hybrid bus production in the near future.

Advanced Diesel Engines

Using an advanced diesel engine instead of a regular gasoline engine can improve fuel efficiency by 35 to 40 percent. (See Table 2). European automobile manufacturers are in the lead in terms of applying advanced diesel engines to passenger vehicles. Sales

of diesel cars accounted for about 50 percent of all passenger vehicle sales in Western Europe in 2005. In comparison, almost all the cars sold in China run on gasoline (99 percent in 2005). China's central decision-makers have not yet decided whether the country should follow the European path to dieselize cars to improve fleet fuel efficiency. The hesitation results from the higher production costs of diesel engines, the low quality of Chinese diesel, and the difficulty of diesel vehicles to meet future stricter emission standards.¹³ The majority of new heavy-duty vehicles (i.e., trucks and buses) made in China have been dieselized. Despite this, Chinese-made heavy trucks on average are still about 20 percent less efficient than comparable models produced in industrialized countries (China Automotive, 2005). Moreover, there are no fuel efficiency standards for heavy duty vehicles.

R&D Expenditure

Low technology development in Chinese-produced cars stems from the paltry R&D expenditure of China's domestic automobile industry—about 1.3 percent (about \$13 million) of its total turnover was spent on R&D in 2003, which is considerably less than the R&D expenditure of automobile companies in industrialized countries (on average about 5 percent of revenues) (Safford & Prasad, 1999). Japanese automobile companies lead in R&D

spending: in the late 1990s, Toyota and Nissan spent about 6.3 and 9.3 percent of their revenues on R&D, respectively. Indeed, R&D expenditure in the motor vehicle industry accounts for a very large share of manufacturing expenditure in the EU, the United States, and Japan.¹⁴

Technology-Pushing Regulations

Analysis of historical trends in fuel economy in OECD countries shows that when regulations and policies to improve fuel economy are absent, efficiency-related advances have frequently been used to improve vehicle performance, instead of reducing fuel consumption (Zachariadis, 2006). The fuel economy of the U.S. fleet has been stagnant since the mid-1990s, although fuel-efficient technologies have improved. Such technologies are often used to accommodate increased vehicle weight and to improve performance such as total horsepower and time to reach 60 miles per hour from a stop (U.S. Environmental Protection Agency, 2005). In contrast, during the last decade, high fuel taxes and the voluntary agreement of auto manufacturers to reduce CO₂ emissions in Europe and Japan have led to continual improvements in fleet fuel efficiency. The divergent paths taken by the United States, the EU countries, and Japan demonstrate the importance of deliberate government policies and actions in directing automakers' R&D efforts, influencing vehicle fuel efficiency and car use, and ultimately affecting transport fuel consumption per capita.¹⁵ The next section presents a discussion of fiscal policies in industrialized nations that China could potentially adopt to reduce energy consumption by encouraging the purchase of efficient vehicles and restraining personal vehicle ownership and use.

FISCAL POLICIES FOR PROMOTING EFFICIENT VEHICLES AND VEHICLE USE

International experience demonstrates that well-designed fiscal policies can promote cleaner and more efficient road transport by influencing people's decisions on vehicle ownership, as well as the duration, volume, and characteristics of vehicle use.

Policies Influencing Ownership

Singapore provides an extreme example of the extent to which a country can restrict the growth of vehicle ownership through prohibitive fees and taxes. With high entitlement and registration fees and tariffs in

Singapore, owning an Audi A4 1.8L is estimated to cost about \$182,000, which is almost five times its sticker price in the United States (ExpatSingapore, 2005).¹⁶ Consequently, Singapore has successfully controlled its vehicle population growth at 3 percent per year since 1990, in contrast to a 7 percent increase in the late 1980s (Singapore Vehicle, 1999).

Many OECD countries do not restrict ownership but have attempted to influence consumers' decisions on what kind of vehicles to purchase by offering incentives such as tax/fee reductions and rebates for clean and efficient vehicles. For instance, the Japanese government provides a hefty (25 to 75 percent) acquisition tax reduction for low-emission vehicles, and also provides direct subsidies for purchasing alternative fuel vehicles. Similarly, Denmark offers a 16.7 percent acquisition tax reduction for gasoline cars with a fuel economy between 60 to 95 mpg, a 67 percent tax reduction for gasoline cars with a fuel economy over 95 mpg, and for diesel cars with a fuel economy over 105 mpg. Germany offers up to \$1,900 (for gasoline cars) or \$2,600 (for diesel cars) exemption of circulation tax if these cars can meet Euro IV emission standards and emit less than 90g of CO₂ per km (equivalent to fuel economy of 60 mpg) (Gordon, 2005). In the United States, buyers of hybrid vehicles can enjoy up to \$3,400 in tax credit, while gas-guzzling cars that get less than 22.5 mpg are subjected to a progressive tax.¹⁷

Policies for In-use Costs

The amount of vehicle use (average mileage driven per year per vehicle) directly influences fuel consumption and emissions. Thus, fiscal policies influencing the total mileage driven, such as fuel and other in-use costs, are more effective than ownership-oriented policies in restraining fuel use and controlling environmental damages by road transport. Overall, the EU countries, by comparison to international standards, have high taxes on fuels. In 2003, fuel taxes accounted for about three-quarters of gasoline retail prices in western European countries, while they comprise only about one-quarter of the gasoline (premium) price in the United States (Gordon, 2005). The percentage has dropped to 60 percent in West Europe and 12 percent in the United States in 2006 due to soaring crude oil prices. Still, gasoline taxes charged in most western European countries are more than ten times higher than those in the United States (\$3.8-4.4 per gallon versus \$0.4 per gallon)(EIA, 2006b). High fuel costs have made Europeans

more frugal than Americans when it comes to driving a car.

The current excise tax on vehicle fuels in China is about 10 cents per gallon. China's fuel taxes are probably lower than in the United States, given that the regulated gasoline price in China (which rose to \$2.5 per gallon only in March 2006) has been lower than the average gasoline price in the United States.¹⁸ If China continues its low fuel price policy, its level of vehicle fuels consumption is likely to follow the U.S. path. Such a path is definitely not sustainable for either China or the world.

China's Fiscal Policies for Autos

At present, there are nine types of taxes and fees pertaining to vehicle purchasing, registration, and utilization in China. These taxes and fees include: value added tax (17 percent); excise tax (3 to 20 percent, depending on engine size);¹⁹ vehicle purchasing tax (10 percent); tariff (25 percent);²⁰ registration fee (about 200 Yuan); road maintenance fees (1,320 Yuan per year for a passenger vehicle); and tolls (China Automotive Technology and Research Center, 2005). Most of these national fiscal policies intend to generate revenue instead of influence vehicle ownership and use. Thus, vehicle ownership is not restrained nationwide except in Shanghai, where the municipal government issues only about 60,000 new vehicle licenses each year, due to its concern for urban congestion and air quality.²¹ Tolls are commonly collected for highway use in China. Like in most countries, they are designed to recover the costs associated with highway construction and maintenance, not to discourage or moderate vehicle use. The only fiscal policy the central government has employed to promote clean and fuel efficient vehicles is the excise tax.

Excise Taxes

In order to encourage automobile manufacturers to produce vehicles with fewer emissions than existing standards, the Chinese government has offered a reduced excise tax for purchasing relatively clean vehicles. Currently, new light duty vehicles (LDVs) in compliance with the national 2007 emission standards enjoy a 30 percent reduction of the excise tax. Emission limits in the Chinese 2007 standards are equivalent to those in Euro III standards, which were effective in the EU from 2000 to 2004.

A new automobile excise tax scheme took effect in China in April 2006 in an effort to discourage the purchase of passenger vehicles with large engines.

The rates of the previous automobile excise taxes ranged between 3 and 8 percent (depending on engine size). When China's central financial agency established the previous tax rates in the early 1990s, the consumption tax rates for SUVs were low (3 or 5 percent), for they were considered to be off-road vehicles and mainly used in the countryside where the economy was less developed (Huang, 2005). Seeing that the high popularity of SUVs and pickup trucks among ordinary U.S. consumers had led to low fleet fuel economy in the United States, the Chinese leadership has been determined to avoid the same trend in China, and decided to impose steep excise taxes on cars and SUVs with large engines. The new excise tax scheme classifies LDVs into six groups based on their engine size.²²

The new tax scheme makes cars with engines smaller than 1.5 liters, which are popular among ordinary Chinese consumers (accounting for about 20 percent of market share in 2005), more appealing due to their low prices. However, the new tax does not have direct impact on the costs of cars with an engine size between 1.5 and 2.0 liters, which contribute to about half of LDV sales in China. Nevertheless, it did push the prices of SUVs and large cars much higher. The excise taxes for cars with an engine size between 2.5 and 3.0 liters increased by 4 percent, and those with engine size between 3.0 and 4.0 liters, by 7 percent. However in China, companies or government agencies are the main buyers of these larger cars—such consumer groups are not sensitive to moderate price increases. Luxury LDVs with very large engines felt the tax impact the most. For example, the price of Toyota's Land Cruiser (4.7 liters, 8 cylinders) in the Chinese market increased by about 18 percent (from about \$90,000 to \$106,000); that of a BMW 750i increased by 13 percent (from about \$168,000 to \$191,000). The long-term oil-saving effects of the high excise taxes on luxury vehicles are yet to be seen, since the sales volume of these vehicles are rather small in China.

Fuel Taxes

Compared to Western countries, refined vehicle fuels are more regulated in China and sold at a relatively cheap price domestically. In summer 2006, gasoline (regular) sold in China was priced around 5 Yuan per liter (\$2.5 per gallon), which was about 17 percent below the average gasoline price in the United States (\$3.0 per gallon), and merely 40 percent of that in Western Europe (\$7 in the Netherlands and

\$6.2 in France) (EIA, 2006b). Because the Chinese central government has worried that high fuel prices will cause rapid inflation and lead to social turmoil, it has intentionally kept taxes on fuels very low.

Since the mid-1990s, the Chinese central financial agencies have been pondering a plan to replace road maintenance fees with a fuel tax so that the charge will be linked to the amount of driving (LDV owners in China must pay about \$165 for road maintenance fees per vehicle each year). However, to date, a fuel tax has yet to be adopted, except for a trial implementation on the island of Hainan Province initiated in 1994.²³ Top officials at China's Ministry of Finance (MoF) publicly announced at the end of 2005 that they anticipate the imposition of a fuel tax before 2010. Nevertheless, before the central government can impose the long-awaited fuel tax, it will have to find ways to address four major barriers (Jia, 2005; Liu, 2005; Xu, 2004; Zhang & Ming, 2005):

(1) *Inflation fears.* There is concern that a fuel tax could spur nationwide inflation; the central government believes the impacts of a fuel tax on China's economy will be less severe when the international oil price drops below \$35 per barrel. This strategy is somewhat ironic since imposing the tax when oil price is high is more likely to make consumers modify their behavior.

(2) *Bureaucratic disputes over tax use.* Road maintenance fees and tolls are currently collected and managed by the Ministry of Transportation (MoT) and their corresponding agencies at local levels; and the revenues are used for road construction and maintenance. In contrast, fuel taxes would be collected by tax bureaus and managed by MoF. These agencies have not reached an agreement on how MoF and MoT would jointly administer the expenditure of road construction and maintenance if China adopts larger fuel taxes while abandoning road maintenance fees and lowering tolls.

(3) *Concerns of overburdening the rural poor.* Chinese policymakers generally believe that fuels used by off-road vehicles, especially agricultural vehicles, should be exempted from taxation. Therefore, to make sure that farmers and other economically disadvantaged vehicle users will not be worse off under a fuel tax, an effective yet easy-to-implement reimbursement plan needs to be developed.

(4) *Disagreement on where to collect the tax.* The debate on whether the tax should be imposed at the pump or at the refinery gate remains undecided. Only 30 percent of transport fuel is purchased at the pump

in China, so it would appear reasonable to collect the tax at the refinery gate. However, large and politically influential state-owned refineries argue that since small, private refineries frequently evade taxes, a fuel tax at the refinery gate would only increase the costs for large refineries, making it even more difficult for them to compete with private ones.

ALTERNATIVE FUELS FOR ROAD TRANSPORT

LPG and CNG Programs

To address vehicle emissions issues and mitigate oil security pressure, the Ministry of Science and Technology (MoST) initiated a "National Clean Vehicle Action Program," which prioritized the research, development, and demonstration projects of alternative fuel vehicles.²⁴ It gave special emphasis to vehicles using liquefied petroleum gas (LPG) and compressed natural gas (CNG). MoST chose nineteen cities and provinces, including Beijing, Shanghai, Tianjin, and Chongqing, to demonstrate LPG and CNG vehicle technologies. As of the end of 2004, these nineteen locales had added 215,000 LPG or CNG vehicles to their bus and taxi fleets and built 712 refueling stations. About half of the buses and taxis in these areas can run on LPG or CNG (China Automotive Technology, 2006). However, some problems have emerged during the program implementation: (1) there are not enough LPG/CNG refueling stations, so many retrofitted vehicles continue running on gasoline; (2) the technologies employed to convert gasoline vehicles to dual-fuel vehicles are often primitive; and (3) the conversion does not always lead to fewer emissions (Zhao & Gallagher, 2003).²⁵

China is likely to continue expanding its use of LPG and natural gas for transportation. Nevertheless, due to limited domestic LPG and natural gas reserves, and because other sectors compete for these two resources (residential use and power generation), LPG and natural gas are likely to remain a minor portion of the total energy used in the Chinese transportation sector.²⁶ Switching bus and taxi fleets from using gasoline to LPG or natural gas is unlikely to relieve China's energy security concern, but it could be beneficial to urban air quality if proper technologies are employed.

Ethanol Pilots

Using domestically available renewable fuels to substitute fossil fuels is an appealing concept to many

oil importing countries. Brazil has been the most successful in achieving this goal.²⁷ In China, pilot projects using the mixture of gasoline and ethanol (10 percent ethanol, E10) first started in five cities in Henan and Heilongjiang provinces in 2002. Encouraged by the successful promotion of E10 in the five cities, the National Development and Reform Commission soon designated nine provinces to promote E10.²⁸ Some of the provinces, such as Anhui, Henan and Jilin, now only allow E10 to be sold at the pump. Four state-owned companies were chosen by the Chinese central government to produce ethanol for E10; MoF and the State Administration of Taxation have offered significant subsidies and the exemption of VAT (17 percent) and excise tax (5 percent) to guarantee the financial viability of these companies.²⁹ These companies produced about 2 million tons of ethanol in 2005, using excess corn and wheat as feedstock.

However, the potential of corn ethanol replacing petroleum fuel is limited, due to the following reasons: (1) the net energy balance of corn ethanol is rather small (at best, energy output from corn ethanol is only about 25 to 40 percent higher than the energy input required to produce it);³⁰ (2) subsidizing a large ethanol industry would be a heavy burden on central coffers; and (3) China needs to use its limited cultivatable land to feed its huge population. Cellulosic ethanol, which can be produced from low-value plant materials such as corn stalks, sawdust, or switchgrass, has a better potential than corn ethanol as a domestic renewable substitute for gasoline in the long run, due to its lower fuel-cycle energy input, long-term low production cost, and lower CO₂ emissions (Hammerschlag, 2006; Worldwatch Institute, 2006). Nevertheless, the technology is not commercially available yet internationally. The United States has paid much attention to cellulosic ethanol in recent years. In his 2006 State of the Union address, President Bush pledged to make cellulosic ethanol, “practical and competitive within six years.” The U.S. Department of Energy (2006) issued a roadmap for developing and deploying technologies that will lead to large-scale, low-cost cellulosic ethanol production. Given their common interest in this biofuel, the United States and China could collaborate on developing and demonstrating cellulosic ethanol technologies.

Coal-to-Liquid Fuels

Another technological solution that MoST started pursuing is coal-to-liquid (CTL) fuels. High crude

oil prices in recent years have raised the aspiration of Chinese coal companies to build CTL facilities. Chinese experts estimate that CTL can be profitable in China as long as the international oil price stays above \$28 per barrel (Xu, 2005a). Shenhua, the largest coal corporation in China, is constructing a direct liquefaction plant in Inner Mongolia. The first phase of the plant is scheduled to finish in 2007 with an annual production capacity of 3.2 million tons; the second phase of the plant will add another 1.8 million tons of annual capacity. In July 2005, Shell and Shenhua signed an agreement to study the feasibility of building a joint, indirect liquefaction CTL plant (with a capacity of 3 million tons per year) in Ningxia. Shenhua aims to raise its CTL capacity to 30 million tons by 2020 (Xu, 2005b). The central government hopes China will be able to produce about 35 million tons of transport fuels from coal by 2020, which could supply 5 to 10 percent of total road transport energy demand. This ambitious goal demands a significant amount of capital investment—at least \$50 billion would be needed—and implies tremendous financial risks (Wang, Li, & Cong, 2005).³¹

From the environmental perspective, if appropriate processes are employed, liquid fuels converted from coal for transport can be ultra-clean (i.e., no residue, no metal) with extremely low levels of aromatics and sulfur. When combined with advanced engine and treatment technologies, such fuels can help to reduce vehicle emissions such as NO_x and PM significantly. However, the coal liquefaction process consumes a considerable amount of energy. Therefore, if the deployment of CTL technology is not coupled with carbon capture and sequestration, the CTL process will lead to more CO₂ emissions (100+ percent) than the oil refining.

Methanol

China’s abundant coal resources also inspired Chinese policymakers to explore the potential of methanol from coal as an alternative to conventional motor fuels. Shanxi Province carried out an experiment on vehicles using a mixture of 15 percent methanol and 85 percent gasoline (M15). Four Shanxi cities started supplying M15 at the pump in addition to regular gasoline in 2002; and three of them became M15-only cities by October 2005. Chery, a domestic automaker, signed an agreement with the provincial government to develop and deliver 620 pure-methanol cars in 2006. In addition, the province also plans to retrofit 600 existing

taxi into pure-methanol cars. The provincial government in Shanxi hopes to expand its methanol production capacity to 10 million tons by 2010.

LESS ENERGY INTENSIVE TRAVEL MODES

Approaches such as improved vehicle technologies and expansion of road systems cannot solve all air pollution, oil consumption, and traffic congestion problems associated with a growing vehicle fleet. A paradigm shift in transportation planning and land use is essential to address these problems adequately. Urban transportation and energy use need to be thought of in terms of a combination of land use and infrastructure patterns that either favor car use, or favor public transport and non-motorized travel modes (Newman & Kenworthy, 1999).

Congestion can cause low vehicle fuel economy and high emissions, due to more time spent idling. The Texas Transportation Institute studies congestion in 85 urban areas throughout the United States each year. It estimates that a total of 2.23 billion gallons of fuel was wasted in 2003 throughout these urban areas due to congestion—about 7.1 million tons of oil equivalent (Schrank & Lomax, 2005).

Many cities in China have started experiencing sluggish traffic flow despite a massive expansion of urban expressways and artery roads. In 2004, the vehicle population in Shanghai increased by 15 percent, and total road length increased by about 19 percent. However, the average traffic speed on urban expressways slowed down by 17 percent. In Shanghai, the average speed on artery roads is less than 13 miles/hour and even lower during peak hours (Shanghai City, 2005). Despite Shanghai's spectacular eight-lane ring roads, the average speed of city driving was not much better in Beijing—about 10 miles/hour (Liu et al., 2005).

Booming urbanization in China is complicating transport challenges. In 1978, less than 18 percent of China's 963 million people were living in 223 urban areas, among which, only 15 cities had a population over one million and 30 had a population between half a million and one million. Twenty-five years later, about 41 percent of China's 1.3 billion people were living in 660 urban areas, among which, 174 areas had population over one million, and 274 had a population between half a million and one million (National Bureau of Statistics, 2005; Song & Zhang, 2002).

Despite such rapid urbanization, today, about 760 million people are still living in China's

countryside. Tension caused by the growing wealth gap between urban and rural areas is one impetus for the Chinese government to push even more urbanization in order to create jobs for the un- and underemployed in the countryside. As new cities expand or emerge, the demand for urban transportation will continue growing.

To reduce transport-related energy consumption, China needs to learn from European cities and their wealthy Asian neighbors by restraining the use of private vehicles, and putting more emphasis on developing efficient and user-friendly transit systems. In an urban setting, driving a car is the most wasteful way of travel, for it takes at least twice as much energy as transit travel (with the exception of the U.S. bus system), and even more energy when compared with urban rail travel. The comparison is particularly striking (3.03 MJ for car versus 0.16 MJ for bus per passenger-km) for the wealthy Asian cities where highly efficient transit systems have been developed. Indeed, one of the main reasons why U.S. cities spend more transport energy for each dollar of wealth generated than European and wealthy Asian cities is because only a very small percentage (3.6 percent) of total passenger kilometers is on public transit. In contrast, about 23 percent of passenger km is on public transit in western European cities and over 64 percent in wealthy Asian cities (Newman et al., 1999).

Aware of the importance of public transport in providing mobility and reducing congestion in urban settings, the State Council issued a policy document in September 2005 requiring cities to give high priority to public transit when planning and developing their urban transportation systems. Many Chinese cities have invested to expand and improve their public transit systems. For example, by 2010, Beijing plans to spend at least 50 percent of its transportation improvement funds on public transit systems, and expects to double the length of its public rail system (to reach 250-300 km, including train, subway, and light rail), and to build a 60-km bus rapid transit (BRT) system. By 2010, travel on public transit is estimated to account for at least 40 percent of total travel in the downtown area (Beijing Transportation Committee, 2004). Nevertheless, like most Chinese cities, Beijing has no intention of restricting personal car ownership. In contrast, Shanghai has restricted personal vehicle ownership by limiting the total number of new vehicle licenses, and it also plans to adopt fiscal policies such as high cordon prices and parking fees to moderate traffic in the near future.³² At the same time, Shanghai also

put much effort to improve its public transit services by building efficient subway and light rail systems and expanding the service area of public buses.

CONCLUSION

Developing a less oil-dependent transport system is critical in reducing China's thirst for foreign oil, and a range of options and strategies can be utilized towards this end. China and other countries are beginning to recognize that reducing energy consumption in road transport without compromising mobility needs should be one of the fundamental goals of sustainable transportation.

Compulsory fuel efficiency standards are essential to push automobile manufacturers to provide more efficient vehicles—China's new fuel economy standard is a good step in this direction. Yet, the standards need to be strengthened if China would like its new vehicle fleet to achieve fuel efficiencies comparable to Japan and the EU. China also has started employing fiscal policies—e.g., excise tax for LDVs—to influence consumer's decisions on the type of vehicle they purchase. Yet a significant difference in transport fuel consumption is only possible if China imposes a steep fuel tax.

While alternative fuel vehicles can help mitigate oil security concerns, their potential in China is limited. LPG and natural gas are clean energy solutions, but supplies must be imported. Conversely, biofuels—particularly coal to liquids (CTL)—have a greater potential to address China's oil security concerns. However, without carbon capture and sequestration, CTL will lead to additional CO₂ emissions. China needs to overcome high production costs, limited technology capability and low infrastructure readiness to make the alternatives commercially competitive and environmentally sound.

Overall, less energy- and land-intensive travel alternatives must be sought out to meet the increasing demands from China's urbanization process. With new urban areas yet to be developed, China has the opportunity to integrate land use and transportation development to achieve the goal of minimizing future energy demand, as well as environmental, and social impacts from urban transport.

While such steps will certainly help China reduce its oil dependence, it is clear that global pressures on an increasingly tight global supply cannot be eased by one country alone. Other major oil consumers who share a common interest in viable oil prices, secured sea-lanes, and a stable international environment,

must also take steps to reduce their oil dependence. The United States in particular is the largest consumer and importer of oil in the world, along with being the most inefficient in its vehicle fleet. The U.S. transportation sector alone accounts for two-thirds of its total oil consumption, and it consumes about 17 percent of global oil produced annually. Actions to curb transport sector oil demand are long overdue in the United States. Many actions required by both China and the United States to reduce their oil demand are similar; ample opportunities for collaboration exist and ought to be explored.

U.S.-based automakers have lagged behind their Japanese and European counterparts in offering consumers highly fuel-efficient vehicles. The Chinese market is young and yet to be shaped; U.S. companies should take this opportunity to work closely with their Chinese partners to develop and produce vehicles that suit their Chinese consumers, use fuel frugally, and generate little emissions. The two nations should identify and undertake meaningful steps to facilitate the deployment of fuel-efficient vehicle technologies and collaborate on developing key technologies for producing biofuels (such as cellulosic ethanol).

The U.S. society is highly dependent on inefficient transportation modes and unsustainable energy needs; Chinese decision-makers should heed the lessons from the U.S. experience, for China's current path has serious environmental and health ramifications. The United States has a wealth of experience in vehicle emissions control that it could share with China; this would also help further strengthen bilateral relations between the two nations.

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REFERENCES

- "A hungry dragon." (2004, Oct. 2). *Economist*. 372(8395).
- An, Feng and Sauer, Amanda. (2004). *Comparison of passenger fuel economy and GHG emission standards around the world*. The Pew Center on Global Climate Change.
- "A tankful of sugar." (2005, Sept. 24). *Economist*. 376(8445).
- Beijing Transportation Committee. (2004). "Beijing transportation development plan 2004-2010." (In Chinese).
- Berger, Yakov. (2004) "China's energy strategy." *Far Eastern Affairs*, 32(3) 45-65.
- Bradsher, Keith. (2006, Mar. 12). "Thanks to Detroit, China is poised to lead." *The New York Times*.
- British Petroleum. (2006). *BP statistical review of world energy 2006*. [Online]. Available: <http://www.bp.com/productlanding.do?categoryId=91&contentId=7017990>.
- Cao, Xin. (2005). "China's energy development strategy and oil security." *Economic Studies*, 57. (In Chinese).
- "Car makers greet 2005 with price cuts." (2005, January 08). *China Daily*.
- China Academy of Engineering and National Research Council. (2003). *Personal cars and China*. Washington D.C.: National Academies Press.
- China Automotive Technology and Research Center. (2005). *China automotive industry yearbook 2004*. Tianjin.
- _____. (2006a). "Auto production and sales as of December, 2005." *China Auto* (January), 21.
- _____. (2006b). *China automotive industry yearbook 2005*. Tianjin.
- China Energy Development Report Editing Committee. (2003). *China energy development report 2003*. Beijing: China Measurement and Calculation Publishing House. (In Chinese).
- "China oil demand." (2005, February 25) *Financial Times*.
- Downs, Erica S. (2004). "The Chinese energy security debate." *China Quarterly*, 177 (March), 21-42.
- Energy Information Administration. (2005a). *World oil balance 2001-05*. Washington D.C.: U.S. Department of Energy.
- _____. (2005b). *International energy annual 2003*. Washington D.C.: U.S. Department of Energy. [Online]. Available: <http://www.eia.doe.gov/iea>.
- _____. (2006a). *International energy outlook 2006*. Washington D.C.: U.S. Department of Energy.
- _____. (2006b). "Weekly (Monday) retail premium gasoline prices, selected countries (U.S. dollars per gallon)." [Online]. Available: <http://www.eia.doe.gov/emeu/international/oilprice.html>.
- European Commission. (2004). *European competitiveness report*.
- European Conference of Ministers of Transport and International Energy Agency. (2005). *Making cars more fuel efficient: Technology for real improvements on the road*. Paris: OECD and IEA.
- ExpatSingapore. (2005). "Owning a vehicle." [Online]. Available: <http://www.expatsingapore.com/once/cost.shtml>.
- Fu, Lixin, Hao, Jiming, He, Dongquan, and He, Kebin. (2000). "The emission characteristics of pollutants from motor vehicles in Beijing." *Environmental Science* 21 (3), 68-70. (In Chinese).

- Gallagher, Kelly Sims. (2003). "Foreign technology in China's automobile industry: Implication for energy, economic development and environment." *China Environmental Series 6*, 1-18.
- _____. (2005). "Limits to leapfrogging in energy technologies? Evidence from the Chinese automobile industry." *Energy Policy*, 34 (4), 383-394.
- Gan, Lin. (2003). "Globalization of the automobile industry in China: Dynamics and barriers in greening of the road transportation." *Energy Policy*, 31 (6), 537-551.
- Gordon, Deborah. (2005, Mar.). *Fiscal policies for sustainable transportation: International best practices*. Paper presented at the International Conference on Fiscal Policies for Promoting Cleaner and More Efficient Vehicle Technologies, Beijing.
- Hammerschlag, Roel. (2006). "Ethanol's energy return on investment: a survey of the literature 1990-present." *Environmental Science and Technology* 40(6), 1744-1750.
- Hao, Jiming, Wu, Ying, Fu, Lixin, and He, Kebin. (2001). "Motor vehicle source contributions to air pollutants in Beijing." *Environmental Science* 22 (5), 1-6. (In Chinese).
- He, Kebin, Huo, Hong, Zhang, Qiang, and He, Dongquan. (2005). "Oil consumption and CO₂ emissions in China's road transport: Current status, future trends, and policy implications." *Energy Policy*, 33, 1499-1507.
- Hill, Joson, Nelson, Eric, Tilman, David, and Polasky, Stephen. (2006). "Environmental, economic, and energetic costs and benefits of biodiesel and ethanol biofuels". *Proceedings of National Academy of Science*. 102(30), 11206-11210.
- Homandinger, Gunter. (2005, March). *Fiscal policies for transport*. Paper presented at the International Conference on Fiscal Policies for Promoting Cleaner and More Efficient Vehicle Technologies, Beijing.
- Hoyos, Carola. (2004, April 10). "China's oil demand set to keep oil prices high." *Financial Times*.
- Huang, Yonghe. (2005, March). *Leveraging the Chinese tax system to promote clean vehicles*. Paper presented at the International Conference on Fiscal Policies for Promoting Cleaner and More Efficient Vehicle Technologies, Beijing.
- International Energy Agency. (2004). *World energy outlook 2004*. Paris: OECD/IEA.
- _____. (2003). *Oil crises and climate challenges—30 years of energy use in IEA countries*. Paris: OECD/IEA.
- International Monetary Fund. (2005). *World economic outlook: Globalization and external balances*.
- Jaffe, Amy Myers and Medlock III, Kenneth B. (2005). "China and northeast Asia." In Kalicki, J. H. and Goldman, D. L. (Eds.), *Energy security: Toward a new foreign policy strategy* (pp.267-290). Baltimore: Woodrow Wilson International Center.
- Jia, Yubao. (2005, February 17). "Reviewing Hainan's ten-year experience in fuel tax." *21st Century Business Herald*. (In Chinese).
- Kahn, Joseph. (2005, June 27). "Behind China's bid for Unocal." *New York Times*.
- Lieberthal, Kenneth and Herberg, Mikkal. (2006, April). "China's search for energy security: Implications for U.S. policy." *NBR Analysis*. 17(1). [Online]. Available: <http://www.nbr.org/publications/Issue.aspx?ID=93a9dcaa-b9d5-4601-ac32-93f702696db5>.
- Liu, Huan, He, Chunyun, Lents, Jim and Davis, Nicole. (2005). *Beijing vehicle activity study*.
- Liu, Shuang. (2005, September 2). "Interest conflicts behind fuel tax debate." *Law & Life*. (In Chinese).
- National Bureau of Statistics. (2005). *China statistical yearbook 2004*. Beijing: China Statistics Press.
- _____. (1998). *China statistical yearbook 1998*. Beijing: China Statistics Press.
- Newman, Peter & Kenworthy, Jeffrey. (1999). *Sustainability and city: Overcome automobile dependence*. Washington D.C.: Island Press.

- Ng, Wei-Shiuen & Schipper, Lee. (2005). "China motorization trend: Policy options in a world of transport challenges." In Kevin A. Baumert and Bradley, R. (Eds.), *Growing in the greenhouse: Policies and measures for sustainable development* (pp. 48-67). Washington D.C.: World Resources Institute.
- REN21 Renewable Energy Policy Network. (2005). "Renewables 2005 global status report." Washington, D.C.: Worldwatch Institute. [Online]. Available: <http://www.ren21.net/globalstatusreport/g2005.asp>.
- Rohter, Larry. (2006, April 10). "With big boost from sugar cane, Brazil is satisfying its fuel needs." *The New York Times*.
- Romero, Simon. (2004, December 23). "China is rising as a rival to US for oil in Canada." *The New York Times*.
- Safford, Mark and Prasad, Kanti. (1999). *Comparison of international transportation R&D expenditures and priorities*. Cambridge, MA: Volpe National Transportation Systems Center, Department of Transportation.
- Schipper, Lee & Ng, Wei-Shiuen. (2004). *Rapid motorization in China: Environmental and social challenges*. Washington D.C.: EMBARQ, World Resources Institute.
- Schrank, David & Lomax, Tim. (2005). *The 2005 urban mobility report*. Texas Transportation Institute, the Texas A&M University System.
- Singapore Vehicle Quota System Review Committee. (1999). *Report of the vehicle quota system review committee*. Singapore.
- Song, Shunfeng & Zhang, Kevin Honglin. (2002). "Urbanization and city size distribution in China." *Urban Studies*, 39 (12), 2317-27.
- United States Department of Energy. (2006). *Breaking the biological barriers to cellulosic ethanol: a joint research agenda*. [Online]. Available: <http://www.doe.genomestolife.org/biofuels/>.
- United States Environmental Protection Agency. (2005). *Light-duty automotive technology and fuel economy trend: 1975 through 2005*. [Online]. Available: <http://www.epa.gov/oms/fetrends.htm>.
- Walsh, Michael P. (2004). "Motor vehicle pollution and fuel consumption in China." In National Research Council, National Academy of Engineering, China Academy of Engineering and China Academy of Sciences (Eds.), *Urbanization, energy and air pollution in China: The challenges ahead* (pp. 9-28). Washington D.C.: National Academies Press.
- Wang, Li, Li, Su and Cong, Feng. (2005, July 25). "A survey of China's coal-to-liquid development." *Xinhua News (Guizhou)*. (In Chinese).
- World Bank. (2006). *World development indicators 2006*. Washington D.C.: The World Bank.
- Worldwatch Institute (2006). *Biofuels for transport: Global potential and implications for sustainable agriculture and energy in the 21st century*. Washington D.C.
- Xu, Wanguo. (2005a, January 20). "Investment heat in coal to liquid fuel." *21st Century Business Herald*. (In Chinese).
- Xu, Wanguo. (2005b, January 17). "Shenhua raises its coal-to-liquid ambition." *21st Century Business Herald*. (In Chinese).
- Xu, Xue'an. (2004, February 1). "When will fuel tax be adopted?" *Law & Life*. (In Chinese).
- Zachariadis, Theodoros. (2006, September). "On the baseline evolution of automobile fuel economy in Europe." *Energy Policy*, 34(14), 1173-1785.
- Zha, Daojiong. (2005). "Interdependence and China's oil supply security." *World Economy and Politics*, (6), 15-21.
- Zhang, Lamei & Ming, Pingshun. (2005, October). "An analysis on the much delayed issuance of fuel tax." *China Auto*, 15 (10), 17-18.
- Zhao, Jimin & Gallagher, Kelly Sims. (2003). "Clean vehicle development in China." *Sinosphere*, 6 (1), 20-28.

Zou Guojin & Li Zhuoran. (2006, July 3). "Ethanol production became profitable with the support of financial policies." *China Taxation News*. (In Chinese).

Zweig, David & Bi, Jianhai. (2005). "China's global hunt for energy." *Foreign Affairs*, 84 (5), 25-38.

NOTES

1. China's energy intensity has dropped significantly (by two-thirds) during the same period (EIA, 2005b).

2. In 2005, coal contributed to about 70 percent of China's primary energy supply, while natural gas accounted for less than 3 percent; in the United States oil, natural gas, and coal accounted for about 40, 24, and 25 percent, respectively, of its total primary energy supply (British Petroleum, 2006).

3. From 1996 to 2003, China's total consumption of gasoline, diesel, and fuel oil increased by about 30, 80, and 20 percent, respectively (National Bureau of Statistics, 1998 & 2005). It should be noted that in 2004, road transport accounted for 86 percent of gasoline consumption in China, while it only accounted for one quarter of diesel consumption (China Automotive Technology and Research Center, 2006b).

4. CSM Worldwide, an international automotive consulting company, predicted that China's total car production would reach 8 million around 2010 (www.csmauto.com/automotive-forecasts); Han (2005) estimated that vehicle production will reach 8 to 10 million by 2010, and 14 to 18 million by 2020.

5. Non-motor travel modes still account for over 40 percent of travel in China.

6. Motorcycles are not included here.

7. Other similar studies anticipate much higher growth rates for China's national vehicle fleet; the International Monetary Fund (2005) predicts that China's total vehicle population will reach 210 million in 2020. Using South Korea as a reference case, Ng and Schipper (2005) estimated that China's car population alone will reach 146 million in 2020.

8. He et al., (2005) assumed a moderate increase of China's total vehicle population over the next twenty-five years; in which case the national vehicle fleet would then be less than 65 million in 2020 and 120 million in 2030 (Walsh, 2004).

9. Chinese fuel economy standards (Phase II) for vehicles lighter than 4,642 pounds (2110 kg) are more relaxed than current Japanese standards (by 4 to 20 percent), but those for heavier vehicles are more stringent (by 15 to 20 percent) than equivalent ones in Japan.

10. Continued models will have a one-year grace period to meet both Phase I and Phase II.

11. During the mid-1980s to the mid-1990s, vehicle fuel economy remained flat due to low oil prices.

12. A full hybrid system has a battery voltage over 300 volts and can sometimes run solely on the battery.

13. Diesel engines generally emit less HC and CO but much more particulates and NOx than gasoline engines. Diesel engines are not widely used in cars sold in the United States, partially because the U.S. Tier II emission standard for NOx is very expensive for diesel cars to meet. Replacing a Euro II, III, and IV gasoline car with a diesel car will triple NOx emission from that car over its lifetime. Particulate emissions are likely to increase by orders of magnitude. Controlling PM and NOx emissions are the most critical and difficult issues for air quality improvement in many Chinese cities. Advanced technologies for controlling particulates and NOx emissions from diesel vehicles demand ultra-low sulfur diesel (sulfur content is less than 15 ppm), which is not likely to be available in China at a large scale in the near future.

14. In 2000, the European motor vehicle industry accounted for 19 percent of total manufacturing R&D expenditure; its U.S. counterpart contributed to 15 percent of total manufacturing R&D; and, the Japanese, 3 percent (European Commission, 2004).

15. The real cost of driving a car has dropped in all countries since the early 1980s, which has increased car ownership and fuel use by private cars worldwide. Nevertheless, the United States stands out for much higher vehicle distance traveled per capita and transport fuel consumption per capita (IEA, 2003).

16. Singapore also adopted an electronic road pricing system to moderate traffic flow at chokepoints of expressways and artery roads during peak hours (e.g., time-variable tolls). At the same time, Singapore invested heavily in mass rapid transit service and integrated bus systems to make public transit attractive.

17. The tax does not apply to light trucks. Today, the only cars in the United States subject to the gas-guzzler tax are high-priced, low sales volume, luxury and performance cars.

18. It is not very clear what percentage of fuel price is attributed to taxes in China. The National Development and Reform Commission has the authority to set the "guidance prices" of gasoline and diesel at the refinery gate, which are supposedly linked to the trading prices of gasoline and diesel in the Singapore, Rotterdam, and New York markets. The two largest Chinese oil companies, China National Petroleum Corporation (CNPC) and China Petrochemical Corporation (Sinopec), which together own over 90 percent of China's total refining capacity, determine the actual wholesale price within an 8 percent range of the guidance prices. Because the regulated prices of gasoline and diesel did not rise consistently with soaring crude oil prices, CNPC and Sinopec claimed that their refineries had suffered several billion dollars of loss in 2005.

19. Excise taxes are collected from vehicle manufacturers directly but they are ultimately reflected in the prices of vehicles.

20. As one of China's promises for entering the WTO, vehicle import tariffs dropped from 28 to 25 percent on 1 July 2006 ("Car makers greet 2005," 2005).

21. People who want to register a vehicle in Shanghai must bid for a license. The mean bidding price of new licenses reached \$2,600 in Shanghai in June 2006.

22. The new excise scheme is criticized for simplifying the relation between engine size and fuel efficiency, i.e., vehicles with larger engines are not necessarily less efficient than those with smaller engines. Policy analysts in China are now discussing a potential adjustment of purchase taxes to reflect fuel efficiency of vehicles directly.

23. Hainan Province combined road maintenance fees, tolls, and vehicle management fees into one fuel tax. Rampant gasoline smuggling occurred because of the big discrepancy between the gasoline price in Hainan and that in its cross-strait neighboring province Guangdong (Jia, 2005).

24. Other ministries and the State Environmental Protection Administration were involved in the program.

25. MoST is also interested in LNG vehicles. Because LNG must be stored at about -160°C (-260°F), sophisticated containers are needed to minimize boil-off, which makes the technology unattractive for passenger vehicles but feasible for large vehicles such as trucks and buses.

26. China has relied on foreign sources for its LPG needs (over a quarter of its demand was met by import

in 2005), and it will have to import large quantities of natural gas by 2010 (IEA, 2004).

27. In 2005, about 40 percent of the fuel sold in Brazil was ethanol (REN21, 2005). Brazilian companies are able to produce ethanol from sugar cane at a very competitive cost—its ethanol is currently sold at less than half the gasoline price at the pump ("A tankful of sugar," 2005); to encourage auto companies to produce vehicles running on "flex fuel" (e.g., can run on pure ethanol, pure gasoline, or gasohol—a mixture of 25 percent ethanol and 75 percent gasoline), the Brazilian government extended tax incentives for ethanol-only vehicles to flex fuel vehicles (Rohter, 2006).

28. These nine provinces are Anhui, Hebei, Heilongjiang, Henan, Hubei, Liaoning, Jiangsu, Jilin, and Shandong.

29. The central agencies and companies negotiated subsidies at different levels for different years. For example, Jilin Fuel Ethanol Company enjoyed a subsidy at 2,763 Yuan per ton of ethanol in 2004, the first year of its production operation (Zou & Li, 2006).

30. See the studies by Hill et al. (2006) and Hammerschlag (2006). In contrast, the energy balance of sugar cane ethanol is much superior (8.3) (Rohter, 2006).

31. In addition, China has also engaged in research on electric and fuel cell vehicles. Nevertheless, wide use of electricity or hydrogen as energy carriers for vehicles is unlikely to be fulfilled in the near future.

32. As a result, the total number of vehicles registered in Shanghai was controlled at about 1 million in 2005, 60 percent less than the total number of vehicles registered in Beijing.

Ecological Behavior among Adolescents in Hangzhou

By Jun Yu and Jocelyn Eikenburg

Following Zhejiang Province's 2002 call to "green" the province by promoting more sustainable development, the provincial capital Hangzhou decided in February 2003 to promote programs to make it an ecologically friendly city. This goal requires not only support from the government, but also participation from individuals—particularly adolescents, for while they are unlikely to be involved in pressuring government and industries for better enforcement of pollution and conservation regulations, their impact on protecting the environment could be considerable. Specifically, if adolescents learn to incorporate more ecological values and behaviors into their daily activities—e.g., saving energy and reducing waste—they help lessen their individual ecological footprint and adopt habits that will last a lifetime. Public participation to protect the environment is not simply accomplished by participating in environmental impact assessment hearings or protesting on the street, but also by changing personal consumption of resources.

After the "ecological city" campaign had been underway for two years, we were curious as to how "green" adolescent students were in Hangzhou. Thus, in October 2004, as part of Shanghai Normal University Professor Cen Guozhen's values research project (funded by China's Ministry of Education), we surveyed 1,178 students in Hangzhou between the ages of 12 and 24. Our 14 survey questions created a daily ecological behavior scale reflecting three facets of ecological behavior: (1) environmental protection (2, 6, 7, 11, 12); (2) protecting wild plants and animals (5, 8, 9, 13, 14); and (3) resource conservation (1, 3, 4, 10). The percentage distributions for responses to each of the 14 questions are shown in Table 1.

Overall, most respondents performed many of these daily ecological behaviors, except for 6

(battery recycling), 8 (tree-planting) and 10 (paper/plastic/metal recycling). These low responses could be due to the limited scope or outreach of recycling programs in Hangzhou. If such facilities exist, but students do not know how or why they should use them, they obviously cannot make recycling a part of their daily lives. In terms of tree planting, not every school has such programs and some areas may not even have land available on which to plant trees.

The best response was for four questions—turning off lights (1) and water (3); double-siding paper (12); and protecting trees (13). These four were clearly the "low hanging fruit" of ecological behaviors, in part because schools emphasize such behavior. Nevertheless, there were six items (2, 6, 7, 8, 10, 14) spanning all three ecological behavior facets, in which there was not a plurality of respondents choosing the frequency "always." Thus, it seems doubtful that the students surveyed integrated a broad range of ecological behaviors into their way of living.

The survey revealed that among the three facets of ecological behavior, students perform the best in resource conservation, followed by protecting wild plants and animals, and worst in environmental protection. Students may pay more attention to resources such as water and electricity because they are more interested in that which they use in their daily life. Animals and plants may arouse emotions such as care and love, which can motivate them to act ecologically. But environmental protection has a much wider range—including water, air, soil and noise pollution. Students may feel they have little control over such issues, which lowers their sense of responsibility and desire to take action.

So how can Chinese society get students more environmentally involved? First, the government

TABLE 1. Frequency Distribution for Daily Ecological Behavior Scale

	How often do you perform the following behaviors?	Never %	Rarely %	Sometimes %	Always %
1	Turn off the light when it is not in use	.4	2.6	15.5	81.5
2	Separately dispose of garbage when there is a sorted garbage can	5.7	23.4	36.9	34.0
3	Turn off the water while brushing teeth	2.1	5.4	15.1	77.3
4	Use refillable pens	5.6	16.2	26.1	52.1
5	Refuse to eat wild or exotic animals	5.4	9.5	22.9	62.3
6	Recycle used batteries	10.8	28.7	34.0	26.5
7	Refuse to buy products that are not environmentally friendly	2.2	16.1	36.3	45.4
8	Participate in tree-planting activities	20.6	43.0	25.1	11.3
9	Refuse to use products made from wild or exotic animals	6.1	13.2	23.1	57.5
10	Recycle paper, plastics and metals	22.5	31.8	25.5	20.2
11	Dispose of garbage only when there is a garbage can available	2.9	8.0	24.4	64.7
12	Use both sides of a piece of paper	2.1	9.1	23.7	65.2
13	Protect and not damage young trees	.9	2.5	16.4	80.2
14	Protect and avoid stepping on flowers and grass	2.5	9.5	44.8	43.2

needs to make opportunities available for the schools and their students. As local governments expand recycling programs, they should work with non-governmental organizations (NGOs) and schools to promote strong public outreach and education. Similar partnerships could enhance organic and green farming. Schools, NGOs and local governments could jointly organize more environmental activities to broaden opportunities for young people to be “green.” Examples include tree planting, nature walks, outdoor environmental studies, visits to environmental facilities such as recycling centers or organic farms, lectures from environmental professionals, and open discussion forums. Another promising avenue would be to encourage

the creation of student environmental groups in elementary, middle, and high schools, which could link up with various domestic and international NGO programs, such as Roots and Shoots, WWF-China, and local university student environmental associations. Cultivating environmental education with Chinese youth could create a whole generation of more ecologically conscious individuals.

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金 木 水 火 土

FEATURE ARTICLE

Spurring Innovations for Clean Energy and Water Protection in China: An Opportunity to Advance Security and Harmonious Development

By Lü Zhi, Michael Totten, and Philip Chou

China has experienced a phenomenal economic boom over the past 26 years—with an average 9 percent annual GDP growth—bringing millions out of poverty and establishing the country as a major economic powerhouse in the world. This growth, however, has been built on a foundation of environmental degradation. The ecological problems in China are numerous, but the two most serious challenges are: (1) destruction of water ecosystems from mismanagement and hydropower construction, and (2) air pollution stemming mainly from coal burning for energy. China's State Council has recognized the lack of clean energy and water as two of the six main bottlenecks for the country's next five-year development.¹ How well or how poorly the Chinese government decides to deal with its energy and water management issues will determine environmental quality within and well beyond China's borders. Current policy and investment trends in China could stimulate stronger clean energy and better water conservation. Of particular note are some integrated resource planning and technology-promoting policies and pilot projects that could not only spark more domestically produced pollution control and energy efficiency products to clean up China, but also turn the country into a leading exporter of such technologies. Creating clean technologies markets could help promote a truly harmonious development cycle in China.

THE ENERGY AND WATER CHALLENGES IN CHINA

The Challenge of Coal

China is the largest consumer of coal—most of it low quality—in the world. Thus it is not surprising that with the largest population and sixth largest GDP, China is the world's second largest emitter of greenhouse gas emissions behind the United States. Moreover, China's economic growth may double carbon dioxide (CO₂) emissions by 2020, overtaking the United States to become the largest climate polluter in the world (Lan, 2005).

China's *National Communication on Climate Change* presented at COP10 in Buenos Aires in 2004 left no doubt as to the monumental climate change threats the country and the world faces. Western China's mountain glaciers already have shrunk by one-fifth, endangering water supplies for a quarter billion Chinese. Global warming would mean one-fourth of China's single crop season area would be lost, resulting in an overall decrease of wheat, rice,

and maize. Cities along China's densely populated southern coast face submersion from rising sea levels and storms (PRC, 2004).

It is easily arguable that the Chinese leadership faces too many domestic economic, social and environmental crises to take on climate pollution responsibilities as well. However, China's domestic air quality and global climate change problems are intimately linked. Each year, more than a million Chinese die from respiratory diseases due to severe air pollution, costing the equivalent annual salaries of 5 million people. China's regional haze, largely caused by coal combustion and burning agricultural wastes, is depressing 70 percent of crops by up to 30 percent (Chameides et al., 1999). Effectively addressing these more immediate air pollution problems would have a major impact on decreasing China's contribution to greenhouse gas emissions.

Water Wastage and Mismanagement

While air quality statistics are gloomy, China also faces a water crisis of epic proportions that threatens to weaken the nation's economic engine. China

has some 2,140 m³ of water per capita, one-fourth the world average (Liu & Chen, 2001). These water resources are spread severely skewed, with 80 percent of the total volume located in southern China, while north China—where two-thirds of cultivated land is located—has only 226 m³ of water per capita, nearly tenfold lower than the national average. Throughout northwestern and northern China, drought affects 27 million hectares (ha) of agricultural land and desertification afflicts some 300 million ha of grasslands. The decrease in cultivable land is primarily due to over-exploitation of water resources by farmers, due to both under pricing of water and wasteful irrigation techniques (Liu & He, 2001). On many farms, water flow per unit of land is 50 to 150 percent above that optimally needed for the crops, wasting water and reducing land productivity (Ma, 1999).

China's water resources per capita may decline to around 1,700 m³ by 2050, which is the threshold of severe water scarcity. Water shortage already has become a critical constraint for socioeconomic development in northern China. The Chinese leadership is responding to the water crisis by simultaneously promoting aggressive water efficiency measures, a doubling or tripling of dams, and vast water transfers from the south to the north.

China's Unique Opportunity

The Chinese leadership stands at an important crossroads in terms of the country's development. The western growth model, which China has in many ways been following, largely fails to address the country's pressing development challenges. Historically, China has spent 12 times more on expanding energy, water, resources, and land, than on efficiency. Some Chinese experts have estimated that if the country can achieve energy efficiency levels comparable to Japan, China would not have to increase its energy supplies in the next 60 years. To achieve this goal, China would have to build on some of the country's more progressive environmental policies that would support stronger pollution control and energy efficiency technologies. China is not only capable of producing cutting edge clean technologies, but also could use the sheer size of its domestic market to accelerate manufacturing experience and learning curves, which would drive down production costs. Chinese companies would thus be positioned to capture an increasing percentage of the global export market for less polluting and energy, water, and resource efficient products.

The global economy is projected to grow tenfold this century, with an extraordinary level of new low-polluting, higher performance products and goods to be purchased by developing and industrialized countries. Using the "California effect"² as a model, some researchers suggest countries with progressive technology-pushing environmental policies and programs can actually enhance their competitiveness in the global market (Porter & van der Linde, 1995). China's Eleventh Five-Year Plan (FYP) and other recent energy policies have been laying the foundation for such technology-pushing policies.

The "Four Efficiencies"

In preparation for the new Eleventh FYP, President Hu and Premier Wen have made striking pronouncements on the importance of China building a great, "resource-conserving and innovating society." They are pushing conservation through some unprecedented laws that prioritize the "four efficiencies" (4Es)—efficient use of energy, water, land use, and natural resources (e.g., metals, minerals, and chemicals). The leadership is ambitiously promoting conservation and renewable energy to help continue its economic boom, as well as to address the growing concerns over pollution and energy security. If the leadership is truly committed to the 4Es they may succeed in turning the country into a major clean technology producer both domestically and globally.³ The looming question is whether this new spirit for enhancing energy and natural resource security will be embraced by the entrenched bureaucracies and traditional resource-inefficient industries or derailed by their lack of transparency, corrupt practices, misallocation of investment capital, and stonewalling of public participation.

This article highlights some innovative energy and water policies and pilot projects that show how the government's push for a more resource-conserving society could work. Such pilots could be crucial for showing the entrenched bureaucracies the prosperity-generating advantages of being "clean and green." We also discuss some technologies and policies used internationally that could easily be adopted in China. If, as we discuss in the next section, Chinese policymakers opt to install more solar and wind energy—which the 2005 Renewable Energy Law requires—they can draw from a rich array of experiences that have been tried internationally and promise a high return on investment (De Moor, et al., 2003; Ghanahan, 2002; Margolis, 2002; Williams, 2002; Elliott, 2001; IEA & OECD, 2000).

OPPORTUNITIES FOR PROMOTING ENERGY EFFICIENCY AND RENEWABLE ENERGY

Energy Efficiency

China's energy intensity has fallen fourfold since the 1980 liberalization of markets. Most strikingly, this reduction in energy intensity led to three gigatons less coal emissions in the 1990s; right in the midst of an economic boom that was lifting 400 million citizens out of poverty. While a Chinese citizen consumes less than half the world average for energy, China's energy intensity per unit of GNP is 50 percent *more* than the world average—five times more than the United States and up to ten times more than Japan. The Eleventh FYP set targets that require per GDP energy consumption to decrease by 20 percent from 2005 to 2010, while per capita GDP doubles by 2010. To reach these goals, energy efficiency gains must meet or exceed a 3 percent annual energy savings rate through 2050 (Hu, 2005). Pursuing energy efficiency and renewable power could become the enabling engine for the nation to leapfrog into a robust, developed nation with a cleaner environment. For example, from 1990 to 2001, the European Union (EU) produced three times the GDP of China with a net increase in CO₂ of only one-eighth that of China's (Papineau, 2005).

Integrated Resource Planning and Efficiency Power Plants

When evaluating the goals of the Eleventh FYP the first question that arises is how China will be able to finance these efforts, as well as the related education, training, certification, R&D, manufacturing, and enforcement work. In China considerable more investment is going into developing coal-fired electric power systems (~\$60 billion per year until 2030) than into cleaner and cheaper energy options (IEA, 2003).

A fundamental tool for securing these savings and avoiding sub-optimal investments in the energy sector is integrated resource planning (IRP). IRP is a well-established, scientifically based methodology that compares costs, benefits, and risks of all supply and demand-side management (DSM) efficiency options (RAP, 2004; Finamore, et al., 2003). China already has experience with energy efficiency programs, many of which were done in partnership with international NGOs and bilateral

organizations. Government studies have concluded that more than 100 GW of new generating capacity by 2020 can be met faster, cleaner, and at least cost through DSM efficiency initiatives (Hu, Moskovitz, & Zhao, 2005). This would otherwise require 2.5 to 6.6 million railroad cars shipping 250 to 660 megatons of coal per year to power plants.

Capturing these savings will require rigorous and transparent implementation of policies and regulatory procedures that, among other things, firmly incorporates IRP as a requirement on decision-making for all grid and power company investments (Hu & Moskovitz, 2004; RAP, 2004). A well-run IRP process prioritizes allocations to projects that offer the most services per unit of investment and numerous ancillary benefits, while avoiding misallocations resulting in lost opportunities (OECD &

While a Chinese citizen consumes less than half the world average for energy, China's energy intensity per unit of GDP is 50 percent more than the world average.

IPCC, 2000). IRP is indispensable for identifying and resolving a myriad of technical, financial, institutional, and market barriers that threaten resource-conserving laws. For example, the Chinese government plans to invest \$30 billion to add 30 GW of nuclear capacity in the next 15 years. The capital costs appear unrealistically low by a factor of two or more based on nuclear industry cumulative empirical construction experience and projected best guesses by nuclear advocates for constructing new reactors (MIT, 2003). Using more reasonable cost estimates shows nuclear energy to be uncompetitive with a portfolio of higher value energy efficient purchases. The \$30 billion could instead bring online 45 GW of wind power, upwards of 100 GW of cogeneration, and more than 100 GW from DSM and end-use efficiency projects (Lovins, 2005).⁴

In 2005, utility experts from Jiangsu Province, Shanghai, Beijing, and elsewhere, began creating an inventory of DSM opportunities—such as high-efficiency lighting, industrial motors, and

appliances—that could be brought “online” more rapidly and cheaply than coal plants. Developed in collaboration with the Natural Resources Defense Council (NRDC) over a 48- to 72-month period, the study effort has resulted in opportunities for 1.7 GW of what are technically referred to as “Efficiency Power Plants” (EPPs). The EPPs have a lifetime delivered cost of \$0.01 per kWh saved, five times less than coal plants (Niederberger & Finamore, 2005).⁵

China also is implementing building, appliance and industrial efficiency standards, which could eliminate the need for 140 giant power plants, prevent the release of 2.8 gigatons of CO₂, and accrue multi-billion dollar net savings by 2020 (Energy Foundation, 2004). In 2005, the government issued a procurement policy requiring government agencies to utilize energy efficient products. Nearly 1,500 product models from 84 manufacturers are included in the first list, encompassing eight product categories (CECP, 2005).

Energy Efficient Building and Appliances

Standards, IRP, R&D efforts, and market transforming incentives are critical tools for ensuring top-of-the-line construction and operation of green buildings. China’s building sector absorbs 40 to 45 percent of the nation’s total energy consumption (Goldstein & Watson, 2002). By 2015 the World Bank estimates that half of the world’s new building construction will take place in China (Langer & Watson, 2004).

Laws passed in 2005 call for all of China’s cities to cut building energy consumption in half by 2010, and achieve two-third reductions by 2020. In addition, one-fourth of existing residential and public buildings in the country’s large cities will be retrofitted to be greener by 2010. Over 80 million m² of building space will be powered by renewables (PRC, 2005). These are impressive goals, although a review by green building experts finds they still fall short of international standards (Goldstein & Watson, 2002). To help raise these standards, cities like Beijing are reaching out to international organizations and businesses to help them retrofit buildings with the most efficient technologies.⁶

In order to achieve these goals the government would have to require the equivalent of Leadership in Energy and Environmental Design (LEED) certification, which is an economically compelling option for this energy-starved country. The State of California is accruing impressive financial savings

in buildings with new LEED-certified construction ranging from \$400 to \$700 per m² (Kats, et al., 2003). If the Chinese government does opt to promote LEED building certification, it will demand ongoing leadership and investment in many areas—training, R&D, resource tools, monitoring and benchmarking, market transformation initiatives, and incentives to spur superior results (Goldstein & Watson, 2002; ACEEE & CEE, 2005).

Standards and incentives for high-performance appliances and equipment accrue similarly large returns on investments (Nadel & deLaski, 2005). China’s eight new minimum energy-performance standards and nine energy-efficiency endorsement labels implemented between 1999 and 2004 will save 200 billion kWh and 250 megatons of CO₂ in the first decade of implementation. This is equivalent to all of China’s residential electricity consumption in 2002 (Wiel & McMahan, 2005).

Since 1999, China’s Certification Center for Energy Conservation Products (CECP) has been partnering with *Energy Star*, the U.S. Environmental Protection Agency’s (EPA) energy efficiency labeling program, leveraging the lessons learned through *Energy Star* to increase the success of CECP’s own marketing programs (McNeil & Hathaway, 2005). Beginning in 2003, a number of owners and managers of large commercial buildings in Shanghai have been working directly with eeBuildings, an EPA voluntary market transformation initiative that helps managers identify low-cost and no-cost efficiency measures to immediately reduce building energy use, operating costs, and greenhouse gas emissions. Within the first year, the program trained 130 building owners and managers responsible for 135 large commercial buildings in Shanghai (Hathaway & McNeil, 2005).

High-Efficiency Co-, Tri- and Quad-generation Systems

Instead of targeting massive investments into large-scale, central coal, nuclear, and hydroelectric generating stations, China could opt to develop economically competitive green and efficient technologies. One technology to more efficiently use coal for electricity would be decentralized combined heat and power (CHP). Whereas central thermal power plants vent 50 to 70 percent of the energy when generating electricity, CHP systems capture this waste heat to co-generate two, three or four different energy services. Moreover, in being sited close to the point of use, CHP systems require significantly

less transmission and distribution (T&D) investment than centralized power plants, and avoid the 15 percent T&D line losses (WADE, 2004).

Recent assessments indicate if China moved to 100 percent high-efficiency decentralized CHP systems by 2021, retail and capital cost savings could reach \$400 billion. At no extra cost, new emissions of CO₂ would drop 56 percent, avoiding 400 megatons of CO₂ emissions per year, and declines in NO_x and SO_x emissions by 90 percent. But these results are possible only if the Chinese government adopts key policies enabling a faster rate of implementation than the current annual CHP addition of 3 GW. Some 100 GW of CHP could be online by 2010 if a number of important power sector reforms occur (WADE, 2004).⁷

Renewable Energy

Accelerating Wind Farms—Cash Cows of the 21st Century

New estimates of global wind power claim turbines at 80 meters (the average height of modern multi-MW wind turbines) could generate 72 TW. The analysts concluded that capturing 20 percent of this power could satisfy 100 percent of the world's energy demand and even produce five times the world's electricity needs [~3 TW] (Archer & Jacobson, 2005). Wind power is cost competitive (about \$0.04/kWh) with new coal, natural gas or nuclear power plants in North America and other parts of the world. Ongoing R&D innovations are expected to reduce wind costs below \$0.03/kWh this decade and \$0.02/kWh the following decade.

China's terrestrial and near offshore wind potential at 80 meters height is estimated at 2,000 GW—among the largest in the world. China's total installed electricity generating capacity in 2005 was 430 GW, of which just 0.7 GW was wind. Currently the Chinese government has a wind power goal of 30 GW by 2020, a recent estimate by wind experts puts China's installed potential at 400 GW before 2050 ("China Exclusive," 2005).

New wind farms in China are selling energy at \$0.04 to \$0.06 per kWh, compared to coal-powered plants at \$0.035 per kWh at the busbar prior to transmission. However, given that most coal is located in the north, the price rises as high as \$0.13/kWh when delivered to southern Chinese cities like Shanghai. In contrast, there are less transmission costs for the near offshore wind resources located in south China. Wind power also avoids the serious health and environmental damages that would, at a minimum, double coal costs if these externalities

were included. The global export market growth opportunities in wind technologies and services for China are massive; a recent assessment indicates 12 percent of the world's electricity by 2020 can be wind powered.

Such high growth rates over 25 years are not unprecedented. Between 1956 and 1980, global installed nuclear capacity grew at an average rate of 40 percent per year. But, like nuclear power in its heyday, wind (and solar) will need supportive public policies to overcome barriers and market failures for sustaining such high growth rates.

Environmental and social issues related to rapid wind growth also need to be addressed at the outset. Wind farms can cause avian and bat mortality, particularly when poorly sited. At the same time, wind will displace many coal plants, thereby helping to reduce another source of bird mortality (AWEA, 2005). The Chinese wind industry can prevent many problems by taking advantage of the considerable research and best management practices undertaken in Europe and North America. Land tenure issues must also be addressed in an equitable and transparent manner; siting wind turbines by seizing land from local communities, as recently happened in southern China, leads to serious conflicts that are preventable by implementing standards and permitting guidelines (NWCC, 2002).

A large percentage of China's wind resources are located in sparsely populated parts, remote from large population centers (e.g., Inner Mongolia and islands off of the southern coast). While this presents critical transmission issues, it also represents an excellent opportunity to foster economic growth in these regions that are among the poorest in China (Brennand, 2000; Ni, Yin & Guo, 2000; Jaccard & Lott, 2000; PRC, 2002).

To the extent that remote wind farms are concentrated in farming and ranching regions, the income from wind royalties could be a major supplement to income for impoverished communities.⁸ Besides helping poorer farmer communities, wind turbines also require several orders of magnitude less water per TWh than fossil or nuclear power plants, a critical benefit for China's water-stressed regions.

Large-Scale Solar Photovoltaic Power Systems

The single largest sustainable energy source on earth is the 125 million GW of sunlight continuously shining upon the planet. Most areas of China have high levels of solar radiation, 1,670 kWh/m² per year, equivalent to 1,700 billion tons of coal

nationwide (Gu & Liu, 2000). China already is the world leader in using solar thermal energy for hot water heaters, with 60 percent of the world's installed systems. The government has set a national target for 300 million m² of thermal energy systems by 2020, a 500 percent increase, annually replacing 40 megatons of coal (Li, 2005; Wang, 2004).

China has 0.05 GW of solar electric photovoltaic (PV) power systems, with projections of 8 GW by 2020 (UNDP, TWAS, & TWNSO, 2003). Notably, economic-engineering analysis of building-integrated photovoltaic (BIPV) systems in China indicates BIPV may already be economical. By using PV panels as façade-cladding components on buildings, the material savings combined with the energy generation greatly reduces the investment payback period by three to four years (Byrne, Alleng, & Zhou, 2001).

Faster growth rates could result from an innovative application for achieving highly competitive PV systems, according to recent engineering assessments (i.e., \$1 per Watt fully installed, \$0.05 per kWh delivered). This new application involves employing a similar cluster production process used in achieving breakthrough cost reductions and productivity gains in liquid crystal display manufacturing. Known as “solar city factories,” these large-scale PV manufacturing systems—can produce low-cost solar cells that could become an extraordinary domestic and global export growth market for China. There are technical challenges in creating cluster PV production plants that demand focused and sustained R&D investments (Keshner & Arya, 2004).

Like wind farms, PV systems require less water than fossil fuel or nuclear power plants, an immense benefit given the utility sector consumes 10 percent of the nation's water. The versatility of PV systems to be sited at or near the point of use enables capturing a range of utility system benefits and savings, and risk reduction and management opportunities (Lovins, et al., 2002).

BIOLOGICAL FOOD, FIBER, FOREST, FEED, AND FUEL FEEDSTOCKS

Black Carbon Soot—Turning a Problem into Progress

China is the world's largest consumer of biomass energy, accounting for 20 percent of total global use. Burning crop residues—a common, although officially banned, practice in China—blankets rural villages in a gray fog, exacerbating smoke

that is generated from rural families cooking and heating over coal or wood fires in homes. Black carbon (BC) aerosols are the active ingredient in this smoke and haze. BC emissions are concentrated in a curving west-to-east swath across the agricultural heartland of China, between Sichuan and Hebei provinces.

The bulk of BC particles are less than one micron in diameter and in China they are the cause of hundreds of thousands of premature deaths each year from respiratory illnesses. BC blocks sunlight, which may be responsible for a 30 percent reduction in China's crop yields for both wheat and rice (Chameides et al., 1999). Additionally, the increased summer floods in the south and droughts in the north—thought to be the largest changes in precipitation trends since 950 A.D.—may be explained in part by BC soot (Qun, 2001). Moreover, some prominent climate scientists believe BC to be the second most important global warming gas after CO₂ (Hansen & Sato, 2001; Jacobson, 2002). The largest emitting country in the world is China, releasing 17 percent of global BC emissions (Streets, 2004).

Assessments and demonstration projects initiated by the China Council on International Cooperation for Environment and Development (CCICED) have identified one promising solution to the BC problem. Instead of burning biomass, small village-scale gasifiers could turn the residues into clean energy. The available residues are enough to meet all rural cooking needs and generate 135 TWh per year of electricity—20 percent more capacity than the Three Gorges Dam (CCICED, 2000). Village-scale gasifiers are being installed in four provinces (Henan, Hubei, Jiangxi, and Shanxi) as part of the \$77 million Efficient Utilization of Agricultural Wastes Project launched in 2002 with support from the Asian Development Bank (ADB, 2002). For the most part, however, the current technology focus is in using direct combustion rather than gasification power plants. The China Energy Conservation Investment Corporation is planning to construct 30 plants (each 24 MW in size) as part of the “Straws and Stalks” program, with longer term plans to construct 100 plants totaling 2.4 GW. Combustion of 20 million tons of crop straws and stalks will displace 10 million tons of coal and increase farm incomes by an estimated 6 billion Yuan (Zhou, 2006).

Biogasification of Livestock Wastes for Energy

China's animal excrement exceeds 2 gigatons per year (Sun et al., 2004). The livestock pollutants—

particularly from the growing number of mega-farms—impose heavy burdens on ecosystems, and are a major cause of non-point source water pollution in China (Zhu, 2000). Biogasification of livestock wastes could help reduce these serious health and environmental problems and provide energy to rural communities (*Editor's Note: See Commentary by Ben Greenhouse in this issue for an example*).

Biogasification and Perennial Feedstocks for Protein Food and Flexi-Fuels

Regeneration of China's grasslands and pasturelands may offer new opportunities for applications of perennial prairie grasses for simultaneously growing protein for animal feed and cellulosic feedstocks for fuel production. This double-value scenario is being promoted in North America through the use of deep-rooting Switchgrass.

Experts estimate an aggressive plan to develop cellulosic biofuels between now and 2015 could enable the United States to produce the equivalent of roughly 8 million barrels of oil per day by 2025 (Greene et al., 2004). Farmers would gain \$5 billion in increased profits per year, consumers would save \$20 billion per year in fuel costs, and society would benefit from 80 percent reductions in U.S. transportation-related greenhouse gas emissions. No new land would be required for production of this substantial quantity of fuel feedstock, while still producing the amount of animal feed protein currently generated by this land now.

Further research on China's 400 million hectares of grassland and pasturelands—three times more than its arable lands—will determine if comparable opportunities exist as experts have identified for the United States. If so, this could play a key role in addressing two colossal growth trends looming in China—the need for more animal protein feed as the population consumes more meat, and the need for secure fuels for the expanding vehicle market. China's world-class leadership in agricultural genetics research and breeding innovations are promising indicators for taking advantage of this potential grasslands-based opportunity.⁹

DRIVING CHINA'S VEHICLE FLEET TOWARDS EFFICIENCY

New Materials for Car Construction

Vehicle production has been doubling every 24 months, and vehicle ownership is projected to

increase to 100 million by 2020. China's adoption of vehicle fuel efficiency standards (higher than current U.S. standards, but less strict than European semi-voluntary standards) will displace more than 210 million barrels of oil (Bradsher, 2005a, 2005b). Expanding the standards to trucks and motorcycles is expected to double the savings (Energy Foundation, 2004). China now consumes 8 percent of world oil, and by some projections could triple consumption by 2020, absent efficiency standards (Wan, 2004). Growing oil demand has already caused concern internationally (fears of China's impact) and domestically (overdependence as a security threat). Replacing oil with bioenergy could provide a modest fraction of the fuel consumed by vehicles, given the large land, water, and agrichemical inputs required (Lynd et al., 2002). Thus, China will not only need to continue pushing high fuel efficiency, but also take advantage of smart transport planning and transit-oriented development (Litman, 2006). (*Editor's Note: See Hongyan He Oliver feature article in this issue for more discussion of clean vehicle policy options*).

Smart Growth for China's Urban Society—Strategic Reserves at Point-of-Need

Improving vehicle fuel efficiency is a necessary, but not sufficient action. There are similarly large savings that could accrue from applying "smart growth" design practices to cities and communities (Newman & Kenworthy, 1989; Muro et al., 2004). "Smart growth" encompasses all the quality-of-life services, amenities, security, aesthetics, health, and clean environment that citizens want in their communities, improving mobility and access for all, but without the sprawl, auto congestion, pollution, and fuel costs (Litman, 2006).

Some cities are pursuing smart growth opportunities, like Kunming in Yunnan Province, which has been working with its sister city, Zurich, Switzerland, over the past decade. The goal of the joint effort is to develop an economically, ecologically, and socially beneficial development process. Comparing the more successful cities in the world, Kunming officials recognized that cities with strong public transport tend to be among the better off cities, while those investing mostly in road construction are less well off (Kunming, 2001). Given China's immense urban growth over the next generation, there are massive energy efficiency benefits to be gained from promoting smart growth policies, incentives, and regulations (Litman, 2006).

A handful of international initiatives are ongoing to help municipalities begin smart growth. For example, the Energy Foundation has been working with municipal officials in Beijing, Kunming, Xian, Shanghai, and Chengdu to implement bus rapid transit systems, with plans to expand to 15 more cities. In this program, high capacity hybrid buses run in express lanes. While they cost about \$0.12 to \$0.19 more to ride than other buses they are much faster and more fuel-efficient (Turner & Ellis, 2005).

These initiatives can strengthen national security by combining smart growth development with super-efficient vehicles. These two measures guarantee their equivalent of secure, widely distributed strategic petroleum reserves (SPRs) (Lovins & Lovins, 1981). The opportunity to displace several billion barrels of oil per year with these gains is equivalent to maintaining nearly seven cost-free dispersed SPRs (Goldwyn & Billig, 2005), thereby helping to strengthen national energy security by making China more resilient to foreign oil disruptions and volatile price hikes.

COAL GASIFICATION WITH CARBON CAPTURE & STORAGE

China's policy and research communities are already immersed in assessing the economic and environmental costs and benefits of technologically leapfrogging the country's massive coal-dependent economy into one of the cleanest, state-of-the-art, coal conversion systems on the planet—coal gasification with carbon capture and storage (CCS) (CCICED, 2003; Ni et al., 2003; NDRC, 2003). Gasification allows for:

- (1) Effective and relatively cheap cleaning of coal;
- (2) Use of advanced gas turbines and combined cycles for greater energy efficiency;
- (3) Power production and fuel synthesis to be economically combined in a polygeneration plants, enabling synergistic efficiencies;
- (4) The starting point for the synthesis of high quality liquid fuels; and,
- (5) Using oxygen-blown gasification and advanced membrane separation of exhaust gases that produce a very clean stream of CO₂ that could be geologically sequestered at an economically acceptable cost.¹⁰

Applying the government's vast coal expansion plans to the scrutiny of a rigorous and transparent

IRP process will ensure all costs and risks are accounted for, so the coal gasification initiatives that do go forward are done cost-effectively, are environmentally sound, and do not exclude other lower-cost energy service options. Applying the IRP process as swiftly as possible to electricity expansion is especially important given the large number of proposed power plants that will burn pulverized coal, not gasified coal with CCS.

IRP can also ensure a rigorous and continuous process for assessing the viability of government plans to increase coal consumption by 225 percent from 2005 to 2050 (Ni, 2005). Each 0.6 GW coal plant competitively displaced by a comparable energy efficiency "power plant" program, wind farm, or solar factory replaces 1.5 to 4 megatons per year of bituminous or brown coal, respectively, which are shipped in 15,000 to 40,000 railroad cars (WCI, 2005).

HYDRO SERVICES

The Potential of Integrated Resource Planning for Hydro Services in China

In April 2005, China's National Development and Reform Commission (NDRC) and four ministries issued a joint announcement—the *China Water Conservation Technology Policy*—a codification to promote a water conservation society. This document notes that developed countries generate some 10 times more economic value per unit of water than China. Moreover, 55 percent of irrigation water in China never makes it to the fields. Thus, there is "a great potential for water conservation" (NDRC, 2005).

The announcement embraces many components constituting an integrated resource planning (IRP) process for delivering cost-effective, efficient water services. These include full water pricing mechanisms, requiring water conservation and efficiency be actively implemented in all water-related projects, setting water conservation targets, and putting water management systems in place that all levels of government must adopt. However, the announcement ultimately falls short of actually establishing an IRP requirement since it fails to include: (1) a thorough and regular comparison of the costs, benefits, and risks of water supply expansion projects; (2) a full range of demand-side conservation methods; and (3) highly efficient techniques for delivering water services. Without these measures, water use will remain unbalanced, investments for

Recovery and Use of Methane from Coal Mines in China

By Casey Delhotal and Barbora Jemelkova

Methane is the primary component of natural gas and is an important clean energy resource. With a global warming potential 23 times greater than carbon dioxide and a relatively short atmospheric lifetime, it is also a potent greenhouse gas (GHG) that accounts for 16 percent of all global, human-induced GHG emissions. A reduction in methane emissions would have a rapid and significant effect on the atmosphere's warming potential.

About 8 percent of all human-induced methane emissions around the world are emitted from coalmines, making coalmine methane (CMM) recovery and utilization an attractive and effective climate change mitigation opportunity. In addition to benefiting the global environment, such projects also increase mine safety and productivity, reduce operational downtime, mitigate local air pollution, and make available a local, clean energy resource. China, the world's leading emitter of CMM, is well suited to host CMM projects for a number of reasons:

- The estimated 26,000 active coal mines in China emitted approximately 13.5 billion cubic meters of methane in 2004, making the coal mining industry China's primary source of methane emissions.
- Projects that drain explosive methane from underground mines can help decrease China's staggering miner fatality rate—at least 7,000 deaths are reported each year, the most of any country.
- As China's economy continues to grow, its demand for new sources of clean and unconventional energy grows as well.



CMM Project Construction at Jincheng Mine in Shanxi Province. ©U.S. Environmental Protection Agency

CMM Projects in China

Thirty projects that utilize CMM are reported to be operating or in development in China. The methane captured at project sites is currently used for electricity generation, thermal power production, town gas distribution, vehicle fuel, chemical industry feedstock, and boiler fuel. These projects collectively generate over 100 MW of power and reduce methane emissions by over 630 million cubic meters annually, equivalent to 1 million metric ton of carbon equivalent (MMTCE). The largest operating project drains 126 million cubic meters per year from Laohutai mine in Fushun, of which 59 million cubic meters is delivered to the Shenyang gas pipeline network for residential distribution. Once the second stage of the project is completed, coalbed methane (CBM) from nearby virgin coal seams will be blended with methane from mining

operations to increase gas production by more than 3 million cubic meters per year.

Barriers to CMM Projects

CMM recovery and utilization projects around the world, especially in developing countries, face a number of barriers to development. For example, project developers may find it difficult to identify and secure a sufficient mix and quantity of debt and equity to finance what are typically capital-intensive endeavors. For example, the capital costs of a power generation project—the most common type of CMM project in China—can be about \$1 million per installed MW.

A project in Jincheng (Shanxi Province), slated for completion in 2008, is considered a success story when it comes to addressing this financial barrier. The project will use engines to generate 120 MW of power at the Sihe mine, reducing GHG emissions by an expected 2.86 MMTCE per year. When completed it will be the largest single CMM project in the world. The portfolio includes a \$117.4 million loan from the Asian Development Bank, a \$20 million loan from the Japan Bank for International Cooperation, a \$37.86 million loan from the Industrial Bank of China, and equity capital from the Jincheng municipal government and two mining industrial groups totaling \$61.24 million. Technical assistance was provided early on from the U.S. Trade and Development Agency in the form of a \$500,000 grant to conduct project design and data analysis. In addition, the Chinese

government has reached a general agreement with the World Bank's Prototype Carbon Fund to sell emission reductions that will be generated under the Jincheng project.

Methane to Markets Partnership

To help overcome financial—as well as regulatory, legal, and technical—barriers to methane project development, the United States launched the Methane to Markets Partnership in 2004. Eighteen national governments, including China, Japan, Australia, and nearly 200 private sector organizations are working collaboratively to advance the cost-effective recovery and use of methane from four major sources: landfills, underground coal mines, natural gas and oil systems, and livestock waste. With the help of this initiative, additional viable methane recovery opportunities will be identified and developed around the world, and countries like China will have the opportunity to make a noticeable impact on their climate footprint.

To learn more, visit the Methane to Markets website at <http://www.methanetomarkets.org> or the website of the Coalbed Methane Outreach Program of the U.S. Environmental Protection Agency (EPA) at www.epa.gov/cmop. Barbora Jemelkova currently works in the Office of Air in EPA and she can be reached at jemelkova.barbora@epa.gov. Casey Delhotal, a former EPA employee, is currently working for RTI International in Beijing on Methane to Markets activities in China; she can be reached at: cdelhotal@rti.org.

water projects will be misallocated, and cost-saving opportunities will be missed (Gleick, 2003a).

An IRP strategy for water examines the least-cost means and lowest risk of providing the water service at the point of use. Therein arises a host of opportunities for securing considerable savings, such as dramatically reducing storage requirements and distribution losses. The State of California, a pioneer in IRP for electricity, has expanded the process into energy and water (CEC, 2005; CPUC, 2005). Extensive research found that 20 percent of the state's total electricity and one-third of total natural gas use were consumed in pumping, distributing, heating and disposing of the state's water (Wilkinson, 2000). The assessments also found that the energy intensive end uses of water (e.g., clothes washing and showers) consume more energy than any other part of the urban water conveyance and treatment cycle. Employing demand-side management programs to increase water efficiency can reduce significant amounts of water, energy, and air pollution, while accruing substantial monetary savings (Cohen, Wolff, & Nelson, 2004; Gleick, Cooley, & Groves, 2005).

Potential IRP Water Applications in China

Construction has already begun on China's ambitious south-to-north water project that will take water in three canals from the Yangtze Basin and carry it 3,000 km to the Yellow, Huai and Hai river basins in the north (GWP, 2005). The \$60 billion price tag for the mega-scale water transfer scheme has been criticized for using outdated and inaccurate assumptions, exaggerating water consumption predictions, and neglecting to perform an integrated resource plan that compares the full costs, benefits and risks of the scheme and evaluates various demand-side management options (Postel, 2005a). For example, rectifying the negative affects of black carbon on China's national water crisis has not been factored into the many studies affirming the need for the south-to-north water transfer scheme. Nor has comprehensive application of super-efficient drip and micro-irrigation systems been factored into water needs assessments.

Obviously, hydroelectric dams and reservoirs will continue to develop across China, where rivers are abundant, large populations are without adequate power and water access, and growth rates for electricity demand and agriculture expansion are high. Notably, nearly half of the proposed new dams worldwide are probably not cost-effective or necessary when evaluated against a large and expanding pool

of water and energy efficiency options. Worldwide, some 1,500 km³ (1,500 trillion liters) of irrigation water is wasted annually (Gleick, 2003b). In China, such waste is driven by: (1) inadequate investments, excessive subsidies, and artificially low water prices (70 to 80 percent below prices in other countries) that create disincentives for conservation; (2) balkanized government decision-making that hinders cross-sectoral cooperation on water conservation; and (3) broad-scale failure to inventory and capture lost water savings opportunities (Butler, 2005).

Dam building in China has increasingly caused conflicts among communities refusing to be resettled and environmentalists demanding more transparency in the decision-making process. These problems also underscore one of the finest attributes of the IRP process—its capacity for establishing confidence among all stakeholders. The transparent process of fairly evaluating all supply and demand-side options for delivering services at the least cost and risk performs a vital role in resolving heated conflicts. Equally valuable is the IRP process of expanding the portfolio of viable options relative to traditional approaches. This enables greater flexibility in selecting dams sites, as well as deferring or foregoing projects that will fragment or destroy biodiversity habitats of global significance or risk resettlement of large numbers of resistant communities.

Drip-by-Drip—Super Efficient Irrigation

One measure of water efficiency is the water effective utilization index (EUI), which is the ratio of the amount of water required by crops divided by the amount of water actually consumed in irrigation. Across China, the EUI is about 40 percent, with canals at 30 to 40 percent. By comparison, EUIs in most developed countries are 60 to 70 percent and over 90 percent in Israel (Li & Zuo, 1997).¹¹

Drip irrigation, embraced in the Chinese government's 2005 water conservation announcement, holds great promise for improving the water productivity of the agricultural sector by two to threefold. Worldwide, researchers have made steady progress in designing drip irrigation systems for water intensive crops that can translate into water savings between 30 to 70 percent compared to conventional flood irrigation systems, while increasing crop yields by 20 to 90 percent (Postel, 2005b; Postel & Richter, 2003). Drip-irrigation techniques also can integrate and more precisely distribute chemical fertilizer and pesticide applications, cutting unnecessary applications by more than half

(OECD, 2005). Currently drip irrigation accounts for only 3 percent of China's irrigated area.

Since the 1990s, Xinjiang Uygur Autonomous Region has made exceptional progress implementing water-efficient agriculture, such as drip irrigation and other water-saving methods on 1.3 million hectares of farmland. This has resulted in reducing irrigation per hectare fifteen-fold. According to northwest China's regional agricultural bureau, 5 km³ of water per year have been freed up and used to plant trees to improve local ecology ("Xinjiang," 2000). Water-stressed Shandong Province also took an early lead in disseminating conservation techniques on three-fourths of its farmland, which accounts for one-third of China's total farmland (U.S. Embassy, 1996).

Reduce, Reuse, Recycle Water

In 2005, six Chinese ministries, led by the Ministry of Water Resources, jointly confirmed a ten-year goal for saving water in industrial companies. The rate of recycled water is targeted to increase to 65 percent by 2010 (although Shanghai has reportedly already reached 80 percent). China's leaders recognize that charging the full economic cost of providing water and wastewater services is important for spurring water conservation and efficiency measures.

Increasing water charges requires a delicate balance of differentiating prices that ensure poor families can afford sufficient access while large water consumers pay higher rates. The country's average urban water price rose nine-fold between 1998 and 2004 ("Cities," 2004). Beijing has proposed raising the average water price another threefold to 6 Yuan (\$0.73) per m³ ("Beijing," 2004). While half of China's 660 cities have imposed wastewater treatment fees, most rates capture only a small fraction of the full processing costs (SEPA, 2004). Moving to full pricing of water and wastewater services is essential, but insufficient if not complemented with an IRP process. The IRP methodology helps prevent resource allocation failures, such as expanding more expensive water supply when a lower level of incentives can deliver a comparable level of water services through efficiency improvements.

While cultural, economic, and educational conditions are dramatically different between China and other water-stressed nations like Israel, there is much to be gleaned from close study and assiduous adoption of best practices that are transferable. For example, Israel has used full pricing of water along with other policy measures to steadily drive down water use by a

factor of six—from 45,000 m³ per million dollars of GDP in 1960 to 7,500 m³ in 2000. In addition, reuse of treated effluents by Israeli farmers is 75 percent of total domestic, commercial, and industrial sewerage flows (Arlosoroff, 2002).

Desalination of Wastewater

The Chinese government expects desalination of waste and seawater to play a more important role in resolving China's water crisis, and recently initiated a \$7 billion project that will build new plants beyond the country's ten existing desalination plants. Treated seawater is expected to make up 37 percent of the water supply in coastal areas by 2020. China's desalination capacity may increase 100-fold by 2020 according to the report, "China Seawater Utilisation Special Topic Programme," jointly formulated by the NDRC, State Oceanic Administration, and Ministry of Finance. The city of Qingdao will be a national-level seawater desalination and comprehensive demonstration city, with seven desalination plants built by the end of 2006 with a capacity of 200,000 m³ per day.

Desalination costs vary by a factor of seven or more, depending on the: (1) type of feedwater (brackish, waste, or seawater); (2) available concentrate disposal options; (3) proximity to distribution systems; and (4) availability and cost of power. Desalination's primary operation cost is for power—one km³ (1 trillion liters) of seawater desalination requires about 500 MW of power. The reduction in unit energy use by desalination plants has been among the most dramatic improvements in recent years due to enhanced energy recovery systems. Estimates considered valid for China today range from a cost of \$0.60 per m³ for brackish and wastewater desalination to \$1 per m³ for seawater desalination by reverse osmosis (Zhou & Tol, 2003).¹²

Desalination of wastewater has double benefits—it reduces contaminated discharges into rivers and expands the city's freshwater supplies at lower cost than importing remote water resources. China's total wastewater discharges annually exceed 60 km³, and as of the late 1990s less than one-seventh of this was treated. Close to 600 million Chinese people have water supplies that are contaminated by animal and human waste. Harnessing 30 GW of cogeneration available in cities and industrial facilities potentially could operate reverse osmosis technologies to purify these wastewaters, while also providing ancillary energy services like space and water heating and cooling.

Hydroelectricity Services

China generates 280 TWh per year from nearly 100 GW of hydropower. By some estimates, between 200 and 300 GW may be constructed in the coming decades. Adoption of a rigorous IRP process could stimulate a many highly competitive energy service options capable of being delivered at lower cost and risk than hydroelectric dams.

A growing body of Chinese scientists are cautioning against over construction of large hydropower projects in southwest China—particularly in the Yangtze River Basin (Chen, 2005). Experts on China's endemic ancient Chinese sturgeon and paddlefish are warning about the irreversible loss of these incredibly large species (up to 7 meters) that travel for 3,000 km from the sea up the Yangtze River. These and other aquatic species are threatened with extinction because dams will block their migration routes.¹³

The threat of massive loss of China's freshwater biodiversity, due to a range of causes in addition to hydropower systems, was reviewed by CCICED, which concluded that China's aquatic ecosystems have received much less attention in comparison with terrestrial ecosystems, with only a handful of major surveys on fish. The marked decline in fish species combined with the inadequate knowledge of freshwater ecosystems underscores the great need for stronger conservation of China's aquatic systems (Ping & Chen, 1998).

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Given the pace and scale of proposed dam projects in southwest China, it is vital to undertake and complete rapid assessments of the freshwater biodiversity in China's river basins. This will help inform the decision-making process as to the risks and costs associated with biodiversity loss from specific proposed projects. In addition to species assessments, another critical factor to assess is a river's carrying capacity, or necessary flows to sustain ecological health.

While the Ministry of Water Resources now acknowledges the importance of ecological flows, flow levels alone are insufficient for sustaining or restoring healthy freshwater ecosystems. Flow modifications that disrupt the magnitude, frequency, duration, timing, and rate of change of hydrologic conditions also disrupt habitats to which the myriad varieties of life in and along the river have become adapted (Postel, 2005b).

Watershed Forest Protection and Regeneration

China's water crisis has been a long time coming, from centuries of human impact, especially from wide-scale deforestation and conversion of wetlands and grasslands to agriculture. The past half-century has witnessed an incredible explosion in the pace of these actions with the effect of: (1) a steady increase in the ferocity and frequency of devastating flood and drought cycles; (2) immense sedimentation run-off that is causing more terrestrial landscapes to desertify, and more reservoirs to fill with silt that shorten the lifespan of dams; and (3) feedback effects from these diverse impacts reducing precipitation, that in turn trigger declining river flows (Ma, 1999).

To reverse these water degradation trends, the Chinese government undertook one of the largest reforestation efforts in the world, planting some 50 billion pine, eucalyptus, and poplar trees since the 1950s. Unfortunately, this sea of monoculture trees has suffered devastating setbacks over the past several decades from severe pest attacks, making the trees more vulnerable to drought and wildfires, resulting in hundreds of millions of dollars in annual losses. The monoculture of trees also has not regenerated important ecosystem service benefits like prevention of floodwaters and soil erosion, let alone regeneration of water tables or soil fertility. Yet another example of how IRP could have been applied to evaluate the full costs of a major investment initiative.

In 2005, China's State Forestry Administration (SFA) began testing the recently developed Climate, Community, and Biodiversity (CCB) standards. The standards help in the design and evaluation of more resilient, multiple-benefit, native forest restoration projects. SFA is beginning such projects in Yunnan and Sichuan provinces, and is considering incorporating the standards into national reforestation criteria to develop projects that concurrently fight global warming, conserve biodiversity, and help local communities (CCBA, 2005).

Funds for watershed forest protection and regeneration have been abundant, but also erratic over time.

A funding mechanism proving to be quite effective and durable in many parts of the world is the allocation of water rights that can be traded. This has been proposed for restoration of the Yellow River, given that downstream water users can produce far more per unit of water consumed than upstream users. While currently “illegal” in China since all water rights reside with the state, some small experimental water trades have occurred.

Important water trade covenants can be contractually agreed upon, whereby some of the payments go towards maintaining and regenerating the upper watershed’s forests, wetlands, and grasslands in order to sustain the quality and quantity of water flows (Appleton, 2002). Hydroelectric dam operators can obtain significant economic benefit from promoting such protection of watershed ecosystems in that reducing sedimentation—a major problem for many of China’s dams—can significantly expand the lifespan of dams (Ma, 1999).

CONCLUSION: HARMONIOUS ENERGY AND WATER OPPORTUNITIES

China stands at a crossroad—environmental policies and investments begun today will determine the country’s ability to stem the growing ecological and human health threats from air pollution and watershed damage. In terms of air pollution threats, China could leverage the “four efficiencies” along with solar and wind power to cost-effectively achieve World Health Organization air quality standards. The World Bank calculates the health benefits of avoiding exposure to fossil fuel particulates for urban residents in China, compared to an emissions-as-usual scenario, could rise to nearly \$400 billion in 2020, equivalent to adding 13 percent to the GDP (World Bank, 1997).

Implementation of pro-environment and secure energy and water options in China would be greatly accelerated if the external costs and risks incurred from fossil fuel combustion and watershed deterioration and diversion were reflected in market prices. The CCICED working group on Environmental Taxes and Pricing has been focusing on this issue for several years and new recommendations are forthcoming. Actions towards internalizing costs of pollution and ecologically destructive practices in China would not only improve the wellbeing of its citizens, but also help the country become one of the world’s

largest exporters of economically attractive energy efficiency, solar, wind, and bioenergy technologies (Porter, 1991; CCICED, 2005; “Wind,” 2005).

By taking on global leadership in the use, manufacture, and export of products that promote efficient use of energy and water, China could promote sustainable prosperity and security, as well as conservation of irreplaceable biodiversity—within and beyond China—for generations to come.

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REFERENCES

ABC & AWEA. (2004). *Proceedings of the wind energy and birds/bats workshop: Understanding and resolving bird and bat impacts*, May 18-19, 2004, Co-Sponsored by American Bird Conservancy and American Wind Energy Association, Washington, DC. [Online]. Available: www.nationalwind.org.

ACEEE & CEE. (2005). *Proceedings of the national conference on market transformation*. American Council for an Energy Efficient Economy and the Consortium for Energy Efficiency. [Online]. Available: www.aceee.org

ADB. (2002). *Biomass use to reduce pollution in People’s Republic of China*. [Online]. Available: http://www.adb.org/media/Articles/2002/657_PRC_China_Biomass_Rural_Development.

- Appleton, Albert F. (2002, November). "How New York City used an ecosystem services strategy carried out through an urban-rural partnership to preserve the pristine quality of its drinking water and save billions of dollars." *Forest Trends*. [Online]. Available: www.forest-trends.org/documents/meetings/tokyo_2002/NYC_H2O_Ecosystem_Services.pdf.
- Archer, Cristina L. & Mark Z. Jacobson. (2005). "Evaluation of global wind power." *Journal of Geophysical Research*, Vol. 110, 2005.
- Arlosoroff, Saul. (2002). *Integrated approach for efficient water use: Case study of Israel*. Presentation at World Food Prize International Symposium, October 24. [Online]. Available: www.worldfoodprize.org/Symposium/02Symposium/2002presentations/Arlosoroff.pdf.
- AWEA. (2005). *Wind fact sheets*. American Wind Energy Association. [Online]. Available: www.awea.org.
- "Beijing to raise water prices." (2004). *Xinhua News Agency*. May 23, 2004.
- Bradsher, Keith. (2005a, September 23). "China sets its first fuel-economy rules." *The New York Times*.
- Bradsher, Keith. (2005b, August 26). "Oil again: China set to tax large engine vehicles." *The New York Times*.
- Brennand, Timothy P. (2000). *Concessions for wind power plants: A new approach to sustainable energy development in China*. UNDP & University of East Anglia, England.
- Butler, Tina. (2005). *China's imminent water crisis*. May 30. [Online]. Available: http://news.mongabay.com/2005/0531-tina_butler.html.
- Byrne, John; Gerard Alleng; & Aiming Zhou. (2001, July). *Economics of building integrated PV in China*. Prepared for the Green Building Workshop, Shanghai, China. [Online]. Available: www.udel.edu/ceep.
- CCBA. (2005). *Climate, community and biodiversity standards*, version 1.0. Climate, Community, and Biodiversity Alliance. [Online]. Available: www.climate-standards.org.
- CCICED. (2005). Task Force on Environmental and Natural Resource Pricing and Taxation, China Council on International Cooperation in Environment and Development. [Online]. Available: <http://eng.cciced.org/cn/company/Tmxxb143/card143.asp?lmid=5223&siteid=1&tmid=302&fbh=143>.
- CCICED. (2003, December). "Transforming coal for sustainability: a strategy for China: Report by the task force on energy strategies and technologies to CCICED." *Energy for Sustainable Development*, Volume VII No. 4. [Online]. Available: <http://eng.cciced.org/cn/index.htm>.
- CCICED. (2000b). *Proceedings of the workshop on polygeneration strategies based on oxygen-blown gasification: Strategic energy thinking for the 10th 5-Year Plan*, 11-12 May. [On-line]. Available: <http://eng.cciced.org/cn/index.htm>.
- CEC (California Energy Commission), *California's water-energy relationship*. CEC-700-2005-011-SF. November 2005. [Online]. Available: www.energy.ca.gov/2005publications/CEC-700-2005-011/CEC-700-2005-011-SF.PDF.
- CECP (China Standard Certification Center). (2005). *China issued procurement policy for energy efficient products*. January 24. [Online]. Available: www.cecp.org.cn/englishhtml/showpage.asp?newsid=30.
- "Cities raise water prices." (2004). *Xinhua News Agency*. December 25. [Online]. Available: www.china.org.cn/english/2004/Dec/115943.htm.
- Chameides, W.L.; H. Yu; S. C. Liu; M. Bergin; X. Zhou; L. Mearns; G. Wang; C. S. Kiang; R. D. Saylor; C. Luo; Y. Huang; A. Steiner; & F. Giorgi. (1999). "Case study of the effects of atmospheric aerosols and regional haze on agriculture: An opportunity to enhance crop yields in China through emission controls?" *Proceedings of the national academy of sciences*, V. 96, 13626-13633, Nov. 24. [Online]. Available: www.pnas.org.

- Chen, Guojie. (2005). "Don't build dams everywhere, expert warns." *ScienceTimes (Kexue shibao)*, December 17, 2004. Translated and reprinted in *Three Gorges Probe*, August 22, 2005, <http://www.threegorgesprobe.org>.
- "China exclusive: Wind energy to serve as China's major power driver." (2005). *People's Daily Online*. Nov. 7, 2005.
- Cohen, Ronnie; Wolff, Gary; & Barry Nelson. (2004). *Energy Down the Drain, The Hidden Costs of California's Water Supply*, NRDC and Pacific Institute. August. [Online]. Available: www.nrdc.org.
- CPUC (California Public Utility Commission). (2005). *Water Action Plan*. December 15, 2005. [Online]. Available: http://www.cpuc.ca.gov/Static/hottopics/3water/051109_wateractionplan.htm.
- De Moor, H.C.C.; Schaeffer, G.J.; Seebregts, A.J.; Beurskens, L.W.M.; Durstewitz, M.; Alsema, E.; van Sark, W.; Laukamp, H.; Boulanger, P.; & Zuccaro, C. (2003). *Experience curve approach for more effective policy instruments*. Paper presented at the 3rd World Conference on Photovoltaic Energy Conversion. [Online]. Available: www.ecn.nl/docs/library/report/2003/rx03046.pdf.
- "Energy efficiency stressed." (2005). *China Daily*. August 08, 2005.
- Energy Foundation. (2004). *China sustainable energy program booklet*. Energy Foundation. [Online]. Available: www.efchina.org/resources.cfm.
- Farinelli, Ugo. (2003). *Sustainable energy strategy for China based on advanced technologies*, CCICED Task Force on Energy Strategies and Technologies. Presentation at the ETSAP Workshop on Energy Modelling for China, Beijing. [Online]. Available: www.iea.org/textbase/work/2003/beijing/14fari.pdf.
- Finamore, Barbara; Hu Zhaoguang; Zhou Fuqiu; Yang Zhirong; Li Weizheng; & Liu Jing. (2003). *Demand-side management in China benefits, barriers and policy recommendations*. [Online]. Available: www.nrdc.org/air/energy/chinadocs/dsm.pdf.
- Ghanahan, Rebecca. (2002). *Questioning inevitability of energy pathways: Alternative energy scenarios for California*, May 21. [Online]. Available: www.nautilus.org/archives/energy/eaef/Fourth_EAEF/Prince_California_Data.pdf.
- Gleick, Peter H. (2003a). "Water use." *Annual Review of Environmental Resources*, Vol. 28:275-314.
- Gleick, Peter H. (2003b). "Global freshwater resources: Soft-path solutions for the 21st century." *Science*, Nov. 28, 2003 V. 302, pp.1524-28. [Online]. Available: www.pacinst.org.
- Gleick, Peter H.; Cooley, Heather; & David Groves. (2005). *California water 2030: An efficient future*. Pacific Institute. September 2005. [Online]. Available: www.pacinst.org.
- Goldstein, David B. and Robert K. Watson. (2002). *Transforming Chinese buildings*. March 14, 2002, Natural Resources Defense Council, www.nrdc.org.
- Goldwyn, David, and Michelle Billig. (2005). "Building strategic reserves." In Jan H. Kalicki & David L. Goldwyn (Eds.). (2005). *Energy and security: Toward a new foreign policy strategy*, Baltimore, MD: Johns Hopkins University Press.
- Greene, Nathan; Celik, F.E.; Dale, B.; Jackson, M.; Jayawardhana, K.; Jin, H.; Larson, E.D.; Laser, M.; Lynd, L.; MacKenzie, D.; Mark, J.; McBride, J.; McLaughlin, S.; & Saccardi, D. (2004). *Growing energy, how biofuels can help end America's oil dependence*. Prepared for National Commission on Energy Policy. [Online]. Available: www.energycommission.org.
- GWP. (2005). *A brief introduction of south-to-north water transfer project*. Global Water Partnership China Secretariat, China Institute of Water Resources and Hydropower Research. [Online]. Available: www.gwpcchina.org.
- Gu, Shuhua and Liu, Wenqiang. (2000). *The role of renewable energy options in China's present and future energy system*. Presented at the conference on East Asia Energy Future. [Online]. Available: www.nautilus.org/archives/energy/eaef/C4_final.PDF.

- Haggart, Kelly. (2005). "Yangtze dams driving 'panda of the water' to extinction." *Three Gorges Probe*, June 3. [Online]. Available: www.three-gorgesprobe.org.
- Hansen, J.E., and M. Sato. (2001). "Trends of measured climate forcing agents." *Proceedings of the national academy of sciences USA*, 98, 14778-4783. [Online]. Available: www.pnas.org.
- Hathaway, David, and Gary McNeil. (2005). "eeBuildings: Sharing Strategies for Improving Building Energy Performance in Shanghai." *China Environment Series, Issue 7*, 104.
- Hu, Xulian. (2005). *Development of China carbon emission scenarios toward 2050*. Presented at COP11 and COP/MOP1 side event, Global Challenges Toward Low--Carbon Economy, Focus on Country—Specific Scenario Analysis. December 3. [Online]. Available: http://2050.nies.go.jp/2050sympo/cop11_side/Hu_COP11.pdf.
- Hu, Zhaoguang; David Moskovitz; & Jianping Zhao. (2005). *Demand-side management in China's restructured power industry how regulation and policy can deliver demand-side management benefits to a growing economy and a changing power system*. World Bank. Available: www.raponline.org.
- IEA. (2003). *World energy investment outlook*. International Energy Agency. [Online]. Available: www.iea.org/textbase/work/2003/beijing/6WEIO.pdf.
- IEA and OECD. (2000). *Experience curves for energy technology policy*. [Online]. Available: www.iea.org/excetp/excetp1.htm.
- Jaccard, Mark and Trent Lott. (2000, May). *The renewable energy portfolio standard: Relevance to the Chinese electricity sector*. Report for the CCICED Working Group on Energy Strategies and Technologies. [Online]. Available: <http://eng.cciced.org>.
- Jacobson, M.Z. (2002). "Control of fossil-fuel particulate black carbon and organic matter, possibly the most effective method of slowing global warming." *Journal of Geophysical Research*, 1:07.
- Kats, Greg; Leon Alevantis; Adam Berman; Evan Mills; & Jeff Perlman. (2003, October). *The costs and financial benefits of green buildings*. A Report to California's Sustainable Building Task Force. [Online]. Available: www.ciwm.ca.gov/GreenBuilding/Design/CostIssues.htm#Cost&Benefit.
- Keshner, Marvin S. and Rajiv Arya. (2004, October). *Study of potential reductions Resulting from super-large-scale manufacturing of PV modules*. National Renewable Energy Lab Report NREL/SR-520-36846. [Online]. Available: www.nrel.gov/ncpv/thin_film.
- Koomey, Jonathan; Arthur H. Rosenfeld; & Ashok Gadgil. (1990). *Conservation screening curves to compare efficiency investments to power plants: Applications to commercial sector conservation programs*. Center for Building Science, Lawrence Berkeley Laboratory. [Online]. Available: <http://enduse.lbl.gov/info/ConsScreenCurves.pdf>.
- Kunming Municipal People's Government. (2001). Third Sino-Swiss Symposium on Sustainable Urban Development and Public Transportation Planning, 24 October. [Online]. Available: http://www3.stzh.ch/mm/download/kunming_symposium.pdf.
- Lan, Xinzhen. (2005). "Clean air, what will the Kyoto protocol mean for the largest developing country in the world?" *Beijing Review*, April 11. [Online]. Available: www.bjreview.com.cn/En-2005/05-11-e/11-china-2.htm.
- Langer, Kenneth and Robert Watson. (2004). "The greening of China's building industry." *The China Business Review*, November-December.
- Li, Hau. (2005). "How China's maturing solar thermal industry will need to face up to market challenges." *Earthscan*, February 21.
- Litman, Todd. (2006). *Online transit-oriented development TDM encyclopedia*, Victoria Transport Policy Institute.
- Liu, C.M. and Z.C. Chen, (Eds.). (2001). *Water strategy for China's sustainable development report 2: Current state of China's water resources and the*

- outlook of future demand and supply*. Beijing, China: China Water Resources and Hydropower Press.
- Liu, C.M. and X.W. He. (2001). *Water problem strategy for China's 21st century*, Beijing, China: Science Press.
- Lovins, Amory B. (2005). *Nuclear power: economics and climate-protection potential*, Sept. 11. [Online]. Available: www.rmi.org.
- Lovins, Amory B.; Datta, Kyle; Feiler, Tom; Rábago, Karl; Swisher, Joel; Lehmann, André; Wicker, Ken (2002). *Small is profitable: The hidden economic benefits of making electrical resources the right size*. Rocky Mountain Institute. [Online]. Available: www.rmi.org.
- Lovins, Amory B., and L. Hunter Lovins. (1981). *Brittle Power, Energy Strategy for National Security*. Prepared for the U.S. Department of Defense's Civil Defense Preparedness Agency. [Online]. Available: www.rmi.org.
- Lynd, Lee R.; Haiming Jin; Joseph G. Michels; Charles E. Wyman; & Bruce Dale. (2002, August). *Bioenergy: Background, potential, and policy*. A policy briefing prepared for the Center for Strategic and International Studies. [Online]. Available: <http://thayer.dartmouth.edu/thayer>.
- Ma, Jun. (1999). *China's water crisis*. Translated 2004, Norwalk, CT: EastBridge Books.
- Margolis, Robert M. (2002). *Experience curves and photovoltaic technology policy*, Presented at Human Dimensions of Global Change Seminar, Carnegie Mellon University. [Online]. Available: <http://hdgc.epp.cmu.edu/maillinglists/hdgcctml/mail/ppt00010.ppt>.
- McNeil, Gary, and David Hathaway. (2005). "Green labeling and energy efficiency in China." *China Environment Series*, (7),72-73.
- MIT. (2003). *The future of nuclear power: An interdisciplinary MIT study*. (New York: MIT).
- MOST. (2004). "China-Germany pastureland study." *China Science and Technology Newsletter*. No. 369. June 10. [Online]. Available: www.most.gov.cn/English/newletter/q369.htm.
- Muro, Mark and Robert Puentes. (2004, March). *Investing in a better future: A review of the fiscal and competitive advantages of smarter growth development patterns*. The Brookings Institution Center on Urban and Metropolitan Policy and Funders' Network for Smart Growth and Livable Communities.
- Nadel, Steve and Andrew deLaski. (2005, April). *Energy department grants petition for new refrigerator energy efficiency standards*. Appliance Standards Awareness Project. [Online]. Available: www.standardsasap.org/press19.htm.
- Newman, Peter and Jeffrey Kenworthy. (1989). *Cities and automobile dependence: An international sourcebook*. Burlington, VT: Ashgate Publishing Company.
- Ni, Weidou. (2005, August). *China's energy—Challenges and strategy*. Presentation at the GCEP International Workshop: Exploring the Opportunities to Integrate Advanced Coal Technologies with Carbon Capture and Storage in China. [Online]. Available: www.gcep.stanford.edu.
- Niederberger, Anne Arquit, and Barbara Finamore. (2005, May). "Building an efficiency power plant under the clean development mechanism." *The Sinosphere Journal*, Vol. 8:1.
- NDRC. (2005). Announcement 17, *China Water Conservation Technology Policy Outline*. Issued April 21, 2005. NDRC, MOST, Ministry of Water Resources, Ministry of Construction, Ministry of Agriculture. [Online]. Available: http://en.ndrc.gov.cn/policyrelease/t20050621_8427.htm.
- NDRC. (2003). *Comprehensive report on China's sustainable energy development and carbon emission scenario analysis*. Energy Research Institute of the National Development and Reform Commission.
- NWCC. (2002). *Permitting of wind energy facilities. A handbook*. National Wind Coordinating Committee. [Online]. Available: www.national-wind.org.
- OECD. (2005). *OECD review of agriculture: CHINA, 2005*. Organization for Economic

- Cooperation and Development. [Online]. Available: www.oecd.org.
- OECD & IPCC. (2000). *Ancillary benefits and costs of greenhouse gas mitigation*. March 27-29, workshop proceedings of OECD and Intergovernmental Panel on Climate Change.
- Papineau, Mary. (2005). "China Beyond 2012." *Cicerone Newsletter*, March 4, Center for International Climate and Environmental Research. [Online]. Available: www.cicero.uio.no/fulltext.asp?id=3484&lang=en.
- Ping, Xie & Chen Yiyu. (1998). *Biodiversity problems in freshwater ecosystems in China: Impact of human activities and loss of biodiversity*. CCICED. [Online]. Available: <http://monkey.ioz.ac.cn/bwg-cciced/english/bwg-cciced/tech-31.htm>.
- Porter, Michael E. & Claas van der Linde. (1995). "Green and competitive: Ending the stalemate." *Harvard Business Review*, September-October.
- Porter, Michael E. (1991). "America's green strategy." *Scientific American*, Vol. 264, p. 68
- Postel, Sandra. (2005a). *Liquid assets: The critical need to safeguard freshwater ecosystems*. Worldwatch Institute.
- Postel, Sandra. (2005b). "From the headwaters to the sea, The critical need to protect freshwater ecosystems." *Environment*, Vol. 47, No. 10, December, pp. 8-21.
- Postel, Sandra & Brian Richter. (2003). *Rivers for life: Managing water for people and nature*. Washington, DC: Island Press.
- PRC. (2005). *Renewable energy promotion law*. Adopted at the 14th meeting of the Standing Committee of the 10th National People's Congress on February 28, 2005. [Online]. Available: www.renewableenergyaccess.com/assets/download/China_RE_Law_05.doc.
- PRC. (2004, October). *The People's Republic of China initial national communication on climate change*. [Online]. Available: www.ccchina.gov.cn/english/source/da/da2004110901.pdf.
- PRC. (2002). *Evaluation of policies designed to promote the commercialization of wind power technology in China*. MoST, State Development Planning Commission, and State Economic and Trade Commission, May 15. [Online]. Available: www.ef.org/china.
- Qun Xu. (2001). "Abrupt change of the mid-summer climate in central east China by the influence of atmospheric pollution." *Atmospheric Environment*, Volume 35, Issue 30, 5029-5040.
- RAP. (2005). "Clean energy policies for electric and gas utility regulators." *Issues Letters*, January. Regulatory Assistance Project. [Online]. Available: www.raponline.org.
- SEPA. (2004). *Pollution control may not meet targets*. June 3, [Online]. Available: http://www.vecc-sepa.org.cn/eng/news/news_detail.jsp?newsid=eeee0543.
- Streets, David G. (2004). *Black smoke in China and its climate effects*, Asian Economic Panel Meeting, October 7-8, Columbia University, Special Panel on Alternative Energy Systems and Priority Environmental Issues for Asia. [Online]. Available: www.earthinstitute.columbia.edu/events/aep/2004/documents/David_G_Streets.pdf.
- Sun, Xinzhang; Sunkui Cheng; & Qinwen Ming. (2004). "Rural ecological engineering: New ideas for resolving China's 'Three Nong' issues." *Research of Agricultural Modernization*, Vol. 25, No. 2.
- Turner, Jennifer L. & Linden Ellis. (2005). *Implications of China's energy growth*. Summary of China Environment Forum Presentation by Doug Ogden and Michael Wang. (5 October) Washington, DC.
- UNDP; TWAS; & TWNSO. (2003). "Renewable energy: China." *Examples of successful uses of renewable energy sources in the south, Sharing innovative experiences*. Volume 8. UNDP, Third World Academy of Sciences and Third World Network of Scientific Organizations. [Online]. Available: <http://tcdc.undp.org/experiences/vol8/content-8new.asp>.
- U.S. Embassy. (1996, June). "Irrigation in China demands more efficient technologies."

Environment, Science and Technology Section. [Online]. Available: www.usembassy-china.org.cn/sandt/mu2irig.htm.

WADE. (2004). *The WADE economic model: CHINA*. World Alliance for Decentralized Energy. [Online]. Available: www.localpower.org.

Wan, Gang. (2004). *Current situation and prospects for development of a clean energy automotive industry in China*. Michelin Challenge Bibendum. [Online]. Available: www.challengebibendum.com.

Wang, Ying. (2004). "Fresh efforts to tap solar energy." *China Daily*. December 24.

Water China. (2003, March). [Online]. Available: www.waterchina.com.

WCI. (2005). *Shipping facts*. World Coal Institute. [Online]. Available: www.wci-coal.com.

Wiel, Stephen & James McMahon. (2005). *Energy-efficiency labels and standards: A guidebook for appliances, equipment and lighting*. 2nd edition. Collaborative Labeling and Appliance Standards Program. [Online]. Available: www.clasponline.org.

Wilkinson, Robert. (2000). *Methodology for analysis of the energy intensity of California's water systems, and an assessment of multiple potential benefits through integrated water-energy efficiency measures*. Lawrence Berkeley National Laboratory. California Institute for Energy Efficiency. January.

Williams, Robert H. (2001, April). *Nuclear and alternative energy supply options for an environmentally constrained world: A long-term perspective*. Paper presented at the Nuclear Control Institute Conference Nuclear Power and the Spread of Nuclear Weapons: Can We Have One Without the Other? Washington, DC. [Online]. Available: www.nci.org/conf/williams/williams.pdf.

"Wind could blow energy crisis away." (2005). *China Daily*. November 4.

World Bank. (1997). *Clean water, blue skies: China's environment in the new century*. (Washington, DC: World Bank).

"Xinjiang develops water-efficient agriculture." (2000). *People's Daily Online*. October 22. [Online].

Available: http://english.people.com.cn/english/200010/22/print20001022_53314.html.

Zhou, Lei. (2006). "China begins using straws for power generation." *China Economic Net*, January 1. [Online]. Available: http://en.ce.cn/Insight/200601/09/t20060109_5768376.shtml.

Zhou, Yuan & Richard S.J. Tol. (2003). *Implications of desalination to water resources in China: An economic perspective*. Working paper FNU-22, Research Unit, Sustainability and Global Change, Center for Marine and Climate Research, Hamburg University. [Online]. Available: www.uni-hamburg.de/Wiss/FB/15/Sustainability/desaltchina.pdf.

Zhu, Tiejun. (2000). "Prevention and control of water pollution caused by agricultural non-point sources in China." *Rural Eco-Environment*, No. 3.

NOTES

1. The six bottlenecks include: rural development, development of central and western regions, social undertakings, science and technology, protection of eco-system and environment, and infrastructure construction.

2. The State of California, sixth largest economy worldwide, has been an unparalleled innovative policy leader in spurring high-performance building, appliance, and vehicle standards, as well as mandating utility efficiency and renewable energy incentive programs, that have accrued myriad environmental and economic benefits. While Americans consume 12,000 kWh per capita per year, the California economy steadily grew while flattening consumption to 7,000 kWh/cap/year as a result of efficiency improvements. In addition, California's zero emission vehicle laws pushed the auto industry to produce cleaner cars that ultimately stimulated a market for them globally.

3. If China comprehensibly pursues the 4Es, efficiency gains matching GNP growth rates could enable China's economy to grow 400 percent without increasing energy from current levels, while freeing up significant capital from the energy sector for further economic growth ("Energy Efficiency Stressed," 2005).

4. As an illustration, China has 500 million kW of installed electric motors, pumps, compressors, consuming 60 percent of the nation's total electric output. Upgrading the motor drive systems with high-efficiency components could displace 100 million kW—equivalent

to 332 coal plants each of 300 MW—with net savings of \$10 billion per year on electricity bills.

5. EPPs represent the capacity for “delivering electricity services” through the installation of an aggregated number of high-efficiency motors, pumps, compressors, lights, electronic ballasts, and other electricity consuming devices located in myriad factories and buildings. Just as a 300-MW coal power plant will generate 1.8 billion kWh per year, a 300-MW EPP will effectively provide 1.8 billion kWh of electricity services through the design improvements embedded in high-performance equipment and devices. For a technical discussion see Koomey, Rosenfeld, & Gadgil (1990).

6. For example, in April 2006, the Beijing Development and Reform Commission visited Washington, DC to secure agreements with the U.S. Department of Energy, energy NGOs (such as the Alliance to Save Energy), and businesses that will undertake building retrofits to help the city reach new energy efficiency goals.

7. Important power sector reforms identified by WADE include: (1) distributed energy (DE) generators should be permitted grid access on transparent and non-discriminatory terms; (2) the locational benefits of DE should be recognized in system charging; (3) emerging industry structures should not entrench market control in the hands of incumbent utilities; (4) the transmission and distribution costs associated with central generation should be fully taken into account in any system planning; (5) fuel and power pricing should be determined by markets; (6) private and foreign DE investors should face no undue commercial, legal or regulatory barriers in carrying out their business; and (7) the overall output efficiency (including usable heat) of utility plants should be rewarded.

8. In the United States, for example, Class 4 winds generating power at an average of \$0.04 per kWh produce 20 kWh per m² per year. With a royalty rate to the landowner of 2.5 percent of revenues generated, the wind royalty amounts to about \$200 per ha per year. For comparison, net farm income in the United States was approximately \$125 per ha, half of which were direct government payments (\$60/ha) (Williams, 2001).

9. Since 2004, Chinese experts have been engaged with the German government in a \$3 million joint project they believe will lay a solid theoretical ground for improving scientific understanding of China’s pastureland ecosystem, and its protection and restoration (MOST, 2004).

10. China has considerable experience in modern oxygen-blown coal gasification, operating 9 GW for nitrogen fertilizer production in the chemical industry (Farinelli, 2003).

11. Beginning in the 1950s, the Chinese government established some 400 experimental irrigation stations throughout the nation. The data gathered enabled scientists to set baselines for major crops under varying ecological conditions.

12. Extrapolating from technological trends, and the promise of ongoing innovations in lower-cost, higher performance membranes, seawater desalination costs will continue to fall. The average cost may decline to \$0.30 per m³ in 2025 (Zhou & Tol, 2003). For comparison, China’s average water prices were about \$0.20 to \$0.25 per m³ for domestic and industrial use, and \$0.34 per m³ for commercial use, to a high of \$0.60/m³ in Tianjin and Dalian (Water China, 2006).

13. Professor Wei Qiwei, at the Yangtze River Fisheries Research Institute calls the continued damming of the river the “ecological desertification of the Yangtze” (Haggart, 2005).

Energy Efficiency. Energy shortages and air pollution from coal are central national security concerns in China. Nanotechnology's potential to improve efficiency in energy storage, production, and conversion are developments that may be crucial to China's future. Scientists are currently fine-tuning cost-effective nano-enhanced photovoltaic films to generate solar power that can be cheaply installed.⁷ New nano-enabled materials promise to make rechargeable batteries more efficient and longer lasting.⁸ Finally, by engineering materials, like metals or ceramics, to be more lightweight and durable, nanotechnology can increase the energy efficiency of buildings and their heating and cooling systems.

CHINESE NANOTECHNOLOGY INITIATIVES

China's investments in nanotechnology have begun to translate into world-class research results in terms of published papers, paper citations, and patents. For instance, a review by the Asia-Pacific Economic Cooperation (APEC) in 2001 indicated that China followed only the United States and Japan in terms of the number of nanotechnology papers published that year. In 2003, the number of nanotechnology related patent applications from China ranked third in the world, behind the United States and Japan.⁹ Efforts by both government and industry have been behind China's rapid ascent to becoming a global nanotechnology leader, most notable is the National Center for Nanoscience and Technology and private company investments.

National Center for Nanoscience and Technology (NCNST). Established in March 2003 by the Chinese Academy of Sciences and the Ministry of Education, NCNST is a nonprofit organization housed within both Beijing and Tsinghua universities. NCNST conducts research in nanoprocessing, nanomedicine, and nanostructures. One of its main focus areas includes environmental application research that has, for example, led to the development of nanoporous zinc sulfide nanomaterials that can be used for photodegradation (disintegration of toxic substances in water using sunlight). These materials evenly disperse throughout water without clumping and they are slightly larger than other types of nanomaterials, which allows for both effective cleanup and easy collection and separation from toxins. In fact, similar materials

are already in use as part of a self-cleaning glass coating on the newly built National Opera House in Beijing.

Private Companies. As is the case in many countries throughout the world, Chinese firms are beginning to make the transition from basic research to the commercialization of nanotechnology. In March 2006, the Project on Emerging Nanotechnologies at the Woodrow Wilson Center released an online inventory that now contains nearly 300 manufacturer-identified, nanotechnology-based consumer products that are available on the market from 15 countries, including China.¹⁰ Products in the inventory cover a wide range of sectors—from cosmetics and personal care items to dietary supplements and cooking supplies, from automotive and home improvement products to stain-resistant clothing. Large and small enterprises are buying, selling, and marketing internationally many such nanotechnology-based products.

NGO FOCUS ON POTENTIAL ENVIRONMENTAL, HEALTH, AND SAFETY RISKS

While nanotechnology holds the promise to alleviate many environmental problems, some researchers and citizen groups are concerned about the potential risks nanotechnology poses to the environment and human health, because of the technology's ability to manipulate matter in a novel way. The effects of nanomaterials—when ingested, inhaled, or applied dermally—remain largely unknown, and there are currently no internationally coordinated risk research and oversight strategies designed to investigate and manage any potential environmental, health, and safety risks that may arise. While such risk research has been ongoing in the United States and the United Kingdom for a few years, China has only recently begun to invest in such research through the establishment of a Nanosafety Lab under the auspices of the NCNST in Beijing. Though much more work needs to be done in this area, any real or perceived hazards that may emerge in the near future may have the effect of hindering public trust in government and industry—both in more developed countries, such as the United States, and in more developing countries, such as China—to manage the effects posed by this emerging technology.

Moreover, while there is an increasing number of Western nongovernmental organizations (NGOs),

such as Friends of the Earth and the ETC Group, focused on mobilizing their constituencies around this issue, it appears that Chinese NGO attention on nanotechnology is lagging. A number of Western environmental organizations have called for a moratorium, or even an outright ban, on nanotechnology activities until more risk research can be conducted.¹¹ Additionally, many organizations have argued that misleading advertising, a lack of accurate labeling, and few life-cycle assessments are all serious safety and oversight issues that must be addressed, particularly because the potential long-term negative effects of nanotechnology in humans and the environment remain unclear.

Since developments in nanotechnology are expected to become a key, transformative technology of the 21st century, China, the United States, and the rest of the world have the opportunity to work with industry, government, NGOs, and the general public to ensure that nanotechnology's benefits are maximized and that risks are minimized right from the start.

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NOTES

1. LuxResearch. (2005). "The U.S., Japan, South Korea, and Germany dominate in nanotechnology today—But Taiwan and China are rising," [Online]. Available: www.luxresearchinc.com/press/RELEASE_Nation2.pdf.
2. Hillie, Thembala; Munasinghe, Mohan; Hlope, Mbhuti; Deraniyagala, Yvani. (2006). *Nanotechnology, water and development*. Meridian Institute. [Online]. Available: <http://www.merid.org/nano/waterpaper>.
3. Nanoforum. (2006). *Nano and the environment*. [Online]. Available: <http://www.nanoforum.org>; Singer, Peter; Salamanca-Buentello, Fabio; & Daar, Abdallah. (2005). "Harnessing nanotechnology to improve global equity." *Issues in Science and Technology*, Summer; Court, Erin; Daar, Abdallah; Persad, Deepa; Salamanca Buentello, Fabio; & Singer, Peter. (2005). "Tiny technologies for the global good." *Nano Today*, April/May.
4. National Center for Nanoscience and Technology. (2005). *Self-assembled ZnS nanoporous nanoparticles as efficient semiconductor photocatalysts*. [Online]. Available: http://www.nanoctr.cn/e_view.jsp?tipid=1120030886981.
5. Duncan Hewitt. (November 17, 2000). "China's environmental challenge." *BBC News*, [Online]. Available: http://news.bbc.co.uk/1/hi/in_depth/asia_pacific/1027824.stm.
6. UNESCO. (2006). *The ethics and politics of nanotechnology* [Online]. Available: <http://unesdoc.unesco.org/images/0014/001459/145951e.pdf>
7. Meridian Institute (2005). *Nanotechnology and the poor: Opportunities and risks*. [Online]. Available: <http://www.meridian-nano.org/gdnp/paper.php>.
8. Nanoforum. (2006). *Nanotechnology helps solve the world's energy problems*. [Online]. Available: <http://www.nanoforum.org/dateien/temp/ER%20April%202004%20total.pdf?21062006050326>.
9. *China Daily*. (October 3, 2003). "China's nanotechnology patent applications rank third in world." [Online]. Available: http://www.chinadaily.com.cn/en/doc/2003-10/03/content_269182.htm.
10. Product inventory available at: www.nanotech-project.org/consumerproducts.
11. ETC Group. (April 7, 2006). "Nanotech product recall underscores need for nanotech moratorium: Is the magic gone?" [Online]. Available: <http://www.nanotech-wire.com/news.asp?nid=3156&ntid=&cp=37>.

Energy Efficiency in China: Impetus for a Global Climate Policy Breakthrough?

By Anne Arquit Niederberger, Conrad U. Brunner, and Zhou Dadi

With only limited domestic energy resources and sustained rapid economic growth, China has come to dominate the growth in global oil demand, contributing to record high oil prices over the past year—between 2002 and 2005, China’s oil demand increased by a third. With China’s electricity demand also growing at an alarming rate, staggering investments in coal-fired power generation capacity have failed to keep pace with peak demand, while causing serious environmental harm and hampering economic development. These developments underline the significance of China’s energy and environmental policy choices and the global impact they will have. This crisis is catalyzing new thinking on energy efficiency and renewable energy in China, creating an opportunity for a breakthrough on global climate policy.

The Eleventh Five-Year Plan (FYP) represents a bold shift in government strategy towards a “scientific approach to development.” For the first time, the Chinese Communist Party formally proclaimed that economic growth (measured in GDP terms) is not an adequate measure of economic development. In light of the growing energy challenges, China’s leadership has made a clear commitment to building a more efficient society, which is crucial to achieve the dual quantitative objectives of the Eleventh FYP, namely:

- Doubling of per capita GDP between 2000 and 2010; and,
- 20 percent reduction in energy consumption per unit of GDP over the period 2006 to 2010.

Whereas China is well on track to attain the economic growth target (which would continue the trend in GDP growth achieved between 1980 and 2000), the energy intensity target is much more challenging.

China must both develop its rural economy (which will generate greater demand for energy services) and make the fast growing urban economy more competitive. In the aggregate, the demand for energy services is expected to remain positive for decades to come, but energy efficiency can play a key role in ensuring that this demand is met in a less energy- and greenhouse-gas intensive way. The interdependent drivers of future demand growth include:

- Investment in new residential, commercial, and industrial infrastructure in response to population and economic growth from both migration and urbanization. This will require energy for construction materials (steel, copper, cement, glass, and brick), building operation (heating, hot water, ventilation, cooling, and lighting), and household and office equipment;
- Expansion of industrial production to serve both domestic and export markets; and,
- Transport sector development, including expansion of the national highway network, increasing car ownership rates, and construction of public transportation and rail systems.

Although the energy intensity of the economy declined by over 50 percent between 1980 and 2000 while GDP quadrupled, energy consumption per unit of GDP has begun to climb again as a result of more energy intensive investment, industrial, and export activities. Yet China’s remaining potential to improve energy efficiency is staggering: with electricity demand currently growing at approximately 15 percent annually, the need for huge new generation capacity through 2020 could be eliminated through efficiency improvements which would bring China in line with international best practice.

Globally, there is a massive failure to capitalize on the full potential of demonstrated high-efficiency supply-side and end-use technologies to mitigate climate change. Yet as recent energy scenarios generally agree, energy efficiency will make the most important contribution to climate mitigation over the next decades (the International Energy Agency expects demand-side energy efficiency alone to account for two-thirds of mitigation in its Alternative Policy Scenario 2006). According to the Third Assessment Report of the Intergovernmental Panel on Climate Change, adoption of existing high-efficiency technologies would make it possible to reduce global emissions to below 2000 levels by 2010 to 2020. Half of the potential reductions would result in direct benefits (energy saved) exceeding direct costs (net capital, operating, and maintenance costs). With the price of a ton of 2008-vintage CO₂ allowances in the EU Emission Trading Scheme generally above €7 per ton (\$23)—and stricter commitments on the horizon for the future—the feasibility of realizing this untapped potential is evident.

It is in China's best interest to become a leader in energy efficient technology development, domestic deployment, and export. The government wants to encourage development of the high-tech export sector, decrease dependence on foreign oil, and reduce pollution associated with the use of fossil fuels. China already has a domestic high-tech industry capable of producing products (cars, appliances, lighting, motors, and electronics) that meet the toughest efficiency standards worldwide, as well as great potential for domestic deployment. Thus, the country could take the lead in setting international standards, while improving product quality and branding to better compete in international markets and retain a larger share of value added in China.

With its Energy Conservation Law and plans to implement the energy saving provisions of the Eleventh FYP, China is well positioned to aggressively address barriers to energy efficiency domestically, while playing a proactive role in the UN Framework Convention on Climate Change (UNFCCC) negotiations.

The United States—which is responsible for 25 percent of global greenhouse gas emissions—has rejected the Kyoto Protocol and demanded action from China before it will commit to significant greenhouse gas emission reductions itself. China has no binding greenhouse gas emission limitation commitments under the UNFCCC/Kyoto Protocol. To break the current policy deadlock, it will be crucial to engage both the United States—the largest single emitter, with emissions growth of over 30 percent

since 1990—and key developing countries that have large and rapidly growing greenhouse gas emissions, such as China, Brazil, India, Mexico, and South Korea. This is a difficult challenge, given heavy global dependence on greenhouse gas emitting fossil fuels, national interest, and equity considerations. Energy efficiency represents a promising field for negotiating agreement on a future global climate regime, because energy efficiency is widely attractive to both developing and industrialized countries, due to its large potential, relatively low cost, and multifaceted contribution to sustainable development.

In fact, China should do a much better job of communicating the greenhouse gas emission reductions it has already achieved through energy conservation measures introduced since 2000 (e.g., Medium- and Long-Term Energy Conservation Plan, Renewable Energy Law, Maximum Limits of Fuel Consumption (L/100 km) for Passenger Cars). If China takes the lead, the United States and Europe must respond constructively and are in a good position to commit to—and demonstrate leadership on—energy saving measures, so there are good prospects for international consensus.

China would be well positioned to promote a protocol on energy efficiency that is consistent with the policies and measures it has adopted to promote the country's "scientific approach to development"—such as programs in promoting an energy efficient and resource saving economy, energy efficiency standards, revision of power tariffs (to send proper price signals to consumers and provide incentives for utility-sponsored energy-saving programs), and new product/resource taxes. The Chinese leadership could catalyze a much needed political debate on launching a global energy efficiency offensive in the near term as a means of tapping into low-cost greenhouse gas reduction potential immediately, which can buy time to develop new technologies and fuels and to build the public support and political will needed to adopt policies to reduce emissions even further.

The Eleventh FYP demonstrates an understanding of the symbiotic match between the ethics of sustainable development—which has its foundation in long-term holistic thinking and respect of nature—and the aim of achieving an all around well-off society, based on a scientific approach to development. The policy rhetoric on energy saving is strong in China, but the government needs to work with international partners to overcome its deficit in policy formulation, implementation, and assessment. Climate policy leadership on energy efficiency would not only be beneficial to China, but could also serve as a catalyst to break the current climate policy deadlock.

China's Water-Short Cities: Some Number Games

By James E. Nickum and Yok-shiu F. Lee

CHINA'S WATER-SHORT CITIES

Sources often report that a certain number (now about 400 out of over 660) of China's cities are water short, and a somewhat smaller figure (currently varying from 79 to 130) are seriously short (He and Guo, 2004; Zhou, 2002; Xiao, 2002). These numbers are eagerly picked up by Chinese and foreign analysts to demonstrate the magnitude, and presumed worsening, of China's urban water "crisis." Yet it is hard to know what to make of these measures, which say much less than they seem to. For example, the proportion of water-short cities, roughly two-thirds, has remained relatively constant since the early 1990s despite the rapid growth in the number of cities, urban populations, and economic development during that period (Nanjing Institute, 1997; Qian & Zhang, 2001). If anything, recent claims of shortage, measured by the number of water-short cities, have become slightly less severe over the past decade.¹

There are at least two explanations for this trend, which flies in the face of common wisdom that the water situation in China's cities is deteriorating. One is that the messenger is the problem; the other is that the common wisdom is wrong. We will argue that there are problems with the messenger (the reporting categories) and the message they seem to convey. It is also possible that the common wisdom is not entirely correct, but it is difficult to know for certain because of the problems of the messenger and, more largely, of measurement. We wish to raise two epistemological problems in dealing with reports of water shortages in China's cities—the first explores the definition of cities, the second considers the parameters defining water shortage.

THE FIRST PROBLEM: WHAT IS A CITY?

It is hard to put precise figures on urban growth in China due to of frequent shifts in how the urban population is counted, and because the figure often given for "urban population" (*chengshi renkou*) is actually the total population under municipal (*jianzhi chengshi* and/or *jianzhi zhen*) administration (Lee, 1989). In the post-reform era, the number of cities and their spatial boundaries were pushed up by three major administrative measures: prefectures were turned into cities, rural counties were designated as cities, and suburban counties were transformed into urban districts. For instance, as a result of re-designating suburban counties as urban districts, Beijing's urban area (*jianchengqu*) expanded from 1,270 square kilometres (km²) in 1996 to 6,400 km² in 1998, and Shanghai's urban area increased from 375 km² in 1986 to 3,200 km² by 1998. Between 1976 and 2001, about 400 suburban counties have been re-designated as urban units in China, leading to enormous spatial expansion of cities and contributing to inflated urban population figures (Chung & Lam, 2004).

Moreover, since Chinese municipalities usually include large rural areas (Chongqing, the "largest city in the world," being a particularly egregious example), this can overstate the number of people actually living in built-up urban areas by an order of magnitude (Li, 2002). Thus, China's urban population in 1997 is given as 370 million, or 30 percent of the total population, but only half of this was registered as "non-agricultural" (*fei nongye renkou*)² (Qian, Liu, & Shao, 2002). This high proportion of not-"non-agricultural" urban population might be thought to have significant implications for water

use: if half the municipal population is rural, in all likelihood over half of the water is used in irrigation. But it is not as simple as that. A significant portion of the not-“non-agricultural” population are “floating” urban dwellers with household registrations in rural areas. Not surprisingly, non-agricultural urban populations have grown relatively steadily and modestly, while the figure for total *chengshi* urban population has been quite volatile, rising from 330 million in 1990 to 390 million in 2000, then falling back to 350 million by 2002 (State Statistical Bureau, 2004:15). By 2004, Chinese sources reported that urban population had risen to over 500 million, or 42 percent of the population (*Zhongguo Huanjing Baohu Zongju*, 2005). The statistical confusion does not end there; the 10 percent or so of China’s population that is living in urban areas who carry household registrations in rural areas do not show up in official statistics.

Another problem is that urban figures sometimes include nearly 20,000 towns (*jianzhi zhen*) and sometimes they are more strictly limited to cities (*jianzhi chengshi*), which number in the hundreds. “Water-short cities” refers more strictly to the cities, and not necessarily all of them, because of data limitations.

THE NEXT PROBLEM: WHAT IS AN URBAN WATER SHORTAGE?

One reason that the often cited figure for “water-short cities” may lead to a false, or at least misdirected, sense of panic lies in how that figure is defined. An urban water shortage is determined by comparing the delivery capacity of existing public facilities of water to an estimated level of demand, or “needs,” at a certain level of probability. This level of guaranteed delivery is based on hydrological records, and tends to be much higher for urban and industrial uses than for agriculture. The estimated demand is based on a set of parameters, which include, inter alia, “per capita norm (*dinge*) of comprehensive water use” and “amount of water consumed per 10,000 Yuan of industrial output value.” The values of such parameters, however, vary substantially between different types of cities (Yu et al., 2003). Urban water shortages are then determined in relation to estimated demands for industrial, municipal (*shenghuo*), public facilities, and perhaps even environmental purposes (Liu & He, 1996). They do not include irrigation, commonly the greatest user of water within the larger metropolitan area.

In most cases, an urban water shortage is actually a shortage of infrastructure to divert, develop, treat and deliver water and deal with sewage. Not surprisingly, the source of the water shortage data appears to be the Ministry of Construction. Chinese figures distinguish between three different types of urban water shortage: inadequate water locally, inadequate clean water, and inadequate supply infrastructure (Liu & He, 1996). Cities both north and south report water shortages mostly because of infrastructure lags. Absolute local shortage of water is less often identified, but when it is, it is more likely in the north, while water pollution is more likely to be cited in the south. There may be some overlap in the categories, as well, since where water is short it is also likely to be polluted, because of limited natural capacity to purify discharged wastes.

One of the earliest surveys of urban water shortage appears to have been a 1995 research project carried out by the Ministry of Construction, using 1993 data on 548 out of the (then) 570 cities. Data was not available for the remaining 22 cities. Of the 548 cities, 333 were determined to be water short. Amongst these, 260 (78 percent) were short because of inadequate infrastructure. The ratio was even higher for the 32 megacities, with all but one short because of a construction lag. Forty-nine cities were water short primarily due to a lack of a nearby water source, while only 19 lacked water because of pollution of the water source (although pollution was implicated in an additional 76 cases)(Qian, Liu & Shao, 2002).³ In another survey of 365 cities conducted in the late 1990s for urban planning purposes, 273 cities reported water shortages as a problem. Only 21 cities were found to be water-short because of water pollution, while the majority of these cities were defined as “water short” because their water supply infrastructure was lagging behind the expansion of the urban built-up areas (Pei et al., 2005).

SO HOW SERIOUS IS THE URBAN WATER SHORTAGE IN CHINA (OR CAN WE TELL)?

It would also appear that, with local exceptions in time and place, water shortages may actually be quite limited in their impact. The overall magnitude of China’s annual water deficit is said to be 36 cubic kilometres (km³), five-sixth of which



One of the many—often polluted—canals in Beijing.
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is in agricultural water supply. The remaining 6 km³ shortage in urban and industrial water supply (about 4 percent of total supply) is said to cause a loss of over 200 billion Yuan in gross industrial output value (Wang et al., 2005). This is not a significant share of China's total industrial output value, which was over 14,000 billion Yuan in the year 2003 and had increased by 27 percent over the previous year (*Guojia Tongji Ju*, 2004: 124). In addition, roughly the same magnitude of loss (230 billion Yuan) was reported in the much smaller economy of the early 1990s (Nickum, 1999).

The extent of water shortage is highly contingent upon the values of the parameters used to estimate the demand for municipal (*shenghuo*) and industrial use in a particular city. One might argue that the water shortage in a city could be exaggerated if an overly generous figure of “per capita designated amount of comprehensive water use” is used to calculate overall municipal water demand. For instance, in estimating the city's overall municipal water demand in 2002, Guangzhou followed the figure of 487 liters per capita per day—which was way above the country's average (Zhu & Pu, 2004). By the same token, the extent of shortages could be overstated if the value of another parameter—amount of water consumed per 10,000 Yuan of industrial output value—reflects an inefficient industrial sector that does a poor job in recycling water.⁴ For example, if factories in Guangzhou could increase the rate of industrial water recycling beyond the current 30 percent level, the estimated amount of industrial water demand, and hence, the overall water shortage figure could be greatly reduced.

Actually, it seems that water infrastructure has kept pace with urban growth. The ratio of total daily water delivery capacity to peak daily demand for public delivery systems (*gongshui*) was below 1 between 1974 and 1993, but climbed subsequently to 1.23 in 1999. This statistic was qualified by noting that it does not cover people who “mainly” rely on their own facilities for water (*zhuyao kao zijian sheshi gongshui*)—which covers 145 million out of 370 million urban dwellers in 1999 (Qian, Liu, & Shao, 2002: 15).

An economics editor for the BBC noted that urban China has seen “permanent construction replace permanent revolution” (Davis, 2005). Particular emphasis has been placed in the past decade on increasing the rate of urban wastewater and sewage treatment, estimated at under 5 percent in actual practice (cf. the reported capacity-based treatment figure of 13.4 percent) in 1997 (Qian et al., 2002). This focus on sewerage may reflect a kind of environmental Kuznets effect, where action is taken to address certain problems after a certain threshold per capita income has been attained. Nonetheless, we must caution against assuming that wealth cures past sins in a deterministic fashion, independent of social and institutional factors. Pricing and finance gaps are drivers that open up a number of thorny institutional issues of ownership, operation, and water rights that remain to be resolved before China's ambitious goals of treating 80 percent of urban sewage by 2020 are realized.

CONCLUSION: THE BUREAUCRATIC CONSTRUCTION OF KNOWLEDGE

It should come as no surprise that statistics generated by project-oriented ministries such as construction and water resources should be in large part aimed at making a case for infrastructure development. At the same time, we need to recognize that infrastructure is necessary (but not sufficient) for China's expanding cities, and China's engineering-oriented bureaucracies are not exclusively focused on supply-side aquanomics. Demand management, wastewater recycling, and reallocation among existing uses are increasingly seen as of greater importance for China's cities than opening up new supplies, with the massive exception of the *nanshui beidiao* inter-basin diversions from the Yangtze to the parched north (Qian, Liu & Shao, 2002).

At the same time, even though the most publicized statistical categories on water shortage, to the

extent that they enlighten more than they obscure, appear to indicate that the water shortage is (so far) overrated, this does not mean that China's cities have the solution to their water problems in hand. The small but probably growing proportion of cities with polluted water sources are not addressing sufficiently the problem of the poor water quality flowing through and out of the cities. Pollution of water sources is increasingly coming from the development of economically lagging watershed areas, often in other jurisdictions and frequently due to non-point sources of pollution, such as agriculture and small-scale industry. The construction of sewage plants does not guarantee their effective use or adequate maintenance—even before the current construction boom, it was estimated that the existing plants were operating at well under half their capacity. The knock-on “water footprint” effects of “solving” water shortages through interbasin diversions or groundwater mining do not show up in city-focused data. Indeed, it would seem that bringing sufficient water of adequate quality to urban and industrial users is becoming an increasingly complex problem, requiring innovative political and institutional responses.

ACKNOWLEDGEMENTS

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REFERENCES

- Chung, Jae Ho & Tao-chiu Lam. (2004). “China's ‘city system’ in flux: Explaining post-Mao administrative changes.” *The China Quarterly*, 180, 945-964.
- Davis, Evan. (2005, February 19). “China's thriving new economy.” *BBC News*. [Online]. Available: http://news.bbc.co.uk/2/hi/programmes/from_our_own_correspondent/4274681.stm
- Feng Lihai & Wang Xinbo. (2001). “Strengthening the management of water resources, carrying out water planning and water saving policy.” *Huabei shuili shuidian xueyuan xuebao (Journal of North China Institute of Water Conservancy and Hydroelectric Power)*, 22 (3), 99-101.
- Guojia Tongji Ju (National Bureau of Statistics of China). (Ed.). (2004). *Zhongguo tongji zhaiyao 2004 (China Statistical Abstract 2004)*.
- He Yan-feng & Guo Xin-li. (2004). “Discussion on problems of water resources management in Chinese urbanization process.” *Heilongjiang Shui Zhuan Xuebao (Journal of Heilongjiang Hydraulic Engineering College)*, 31(1), 36-37.
- Lee, Yok-shiu F. (1989). “Small towns and China's urbanization level.” *The China Quarterly*, 120, 771-786.
- Li Liya. (2002). “Research on the urbanization of the extra-megapolis fringe and the reformation of the administrative division system in China.” *Jingji dili (Economic Geography)*, 22(4), pp. 460-464.
- Lin Hongxiao, et al. (2003). *Yongshui guanli lilun yu shijian (The theory and practice of water use management)*. Beijing: Shuili shuidian chubanshe.
- Liu Changming & He Xiwu. (1996). *Zhongguo 21 shiji shui wenti fanglue (China's water problem strategy in the 21st century)*. Beijing: Kexue chubanshe.
- Nanjing Institute of Hydrology and Water Resources. (1997). *Zhongguo shuihan zaihai*. Beijing: Shuili Shuidian Chubanshe.
- Nickum, James E. (1999). “China's water resources facing the millennium.” In *Constraints on Development—Focus on China and India*. (No. 23 in the Population and Development Series of The Asian Population and Development Association, Tokyo), (pp. 71-85).
- Pei, Yuansheng, Zhao Yong, & Zhang Jinping. (2005). “Trends and strategies for urban water resources development and utilization.” *Shuili shuidian keji jinjian (Advances in Science and Technology of Water Resources)*, 25 (4), 1-4.

Qian Yi, Liu Changming & Shao Yisheng. (Eds.). (2002). *Zhongguo chengshi shui ziyuan kechixu kaifa liyong*. Beijing: Zhongguo Shuili Shuidian Chubanshe.

Qian Zhengying & Zhang Guangdou. (Eds.). (2001). *Zhongguo kechixu fazhan shuiziyuan zhanlüe yanjiu zonghe baogao ji ge zhuanqi bagao*. Beijing: Zhongguo Shuili Shuidian Chubanshe.

State Statistical Bureau. (Ed.). (2004). *Zhongguo tongji zhaiyao 2004 (China statistical abstract 2004)*. Beijing: China Statistics Press.

Xiao Jin. (Ed.). (2002). *Chengshi wushui chuli ji huiyong jishu (The technology on the treatment and re-use of urban wastewater)*. Beijing: Huaxue Gongye Chubanshe.

Yu Fang, Guo Xiaomin & Zhang Qiang. (2003). "Definition of the urban water shortage due to pollution and its economic loss valuation approach." *Zhongguo huanjing kexue (China Environmental Science)*, 23 (1), 100-104.

Zhongguo Huanjing Baohu Zongju. (2005). *Zhongguode chengshi huanjing baohu*. [Online]. Available: <http://www.h2o-china.com/news> on 19 June 2005.

Zhou Lü. (Ed.). (2002). *Zhong xiao chengshi wushui chuli touzi juece yu gongyi jishu (Investment strategy and technology for wastewater treatment facilities in small and medium-sized cities)*. Beijing: Huaxue Gongye Chubanshe.

Zhu Xiaojuan & Pu Zhixiao. (2004). "Study of water problems of Guangzhou and the counter-measure of sustainable development." *Shuijiyuan yu shuigongcheng xuebao (Journal of Water Resources and Water Engineering)*, 15 (4), 67-69, 73.

NOTES

1. *Shichang Bao*, 25 March 2005, "Woguo chengshi qieshui 60 yi lifangmi," citing Zhao Qianjun, available online at <http://www.h2o-china.com/news/viewnews.asp?id=28820>.

2. There does not seem to be a comparable category for "agricultural population," probably because those who are not "non-agricultural" are not necessarily agricultural, in the world of Chinese urban statistics, but migrants with rural household registrations.

3. The three categories actually add up to 328, five cities short of the total, for some unexplained reason.

4. The amount of water consumed per 10,000 Yuan of industrial output value in China was 103 cubic meters, which was 10 to 20 times that of developed countries (Feng & Wang, 2001).

COMMENTARY

China's Cities Seize the Initiative: Strengthening Auto Emissions Control on the Streets

By Isabella Notar

One of the main reasons the Chinese central government has failed to create a strong environmental governance system is due to its inability to force powerful local governments to enforce strict pollution and conservation laws. The power devolved to these local governments 26 years ago as part of the free market reforms sparked rapid economic growth—an unsustainable growth built in great part on destruction of the environment. Thus, central leaders have experimented with two types of pollution control measures—creating market mechanisms and recentralizing some pollution control regulations and standards. While some recentralized regulations have tightened standards, some, such as unified emissions controls for motor vehicles, have been kept deliberately weak to accommodate localities less developed than the major cities. In the face of national policies that do not sufficiently address the vast increases in traffic congestion and pollution levels, key Chinese cities—Beijing, Shanghai, and Guangzhou—have taken creative steps to develop *ad hoc* automobile emissions control policies that are stricter than central policies. While strictly transgressions from national policy, these local actions reveal a kind of innovation and local-level collaboration that ultimately could produce effective solutions to China's environmental problems.

ENVIRONMENTAL OVERSIGHT FOR CLEAN AIR REGULATIONS IN CHINA

One fairly well-functioning model of a central government exercising effective oversight of local



Bicycling scene in Beijing. Chinese municipal governments are increasingly discouraging bicycle use on city streets. ©Isabella Notar.

governments to control air emissions (from mobile and non-mobile sources) is in the U.S. Clean Air Act (1990), which requires each state to develop a State Implementation Plan (SIP) to attain the National Ambient Air Quality Standard. If the state fails to submit an approvable SIP within 18 months of the applicable deadline, the federal Environmental Protection Agency (EPA) is required to impose sanctions which may result in the cutoff of federal transportation funds and hold back approval of required federal permits for stationary sources wishing to expand. The EPA is required to promulgate a Federal Implementation Plan (FIP) to fill the gap in the deficient state plan within two years of SIP disapproval.

China's State Environmental Protection Administration (SEPA) does not have the authority or ability to withhold funding in order to enforce national environmental clean air regulations at the local level. The central government has tried to

pressure local governments through a variety of other mechanisms, most of which have failed. For example, in the early 1980s, China introduced the environmental responsibility system, which mandates that local governments are responsible for environmental quality in their region. In the case of a municipality, the mayor is held accountable for fulfilling environmental targets made through written contracts or agreements (Zhang, 2001). SEPA has also created various “model city” programs to publicize cities that have succeeded or failed to meet national air emission standards, but this praise-shame strategy has done little to improve the air quality in China’s cities.

While setting emission standards to guide the auto industry’s development is important in improving air quality, an examination of China’s transport sector reveals that the government’s high standards have overstepped the capacity for enforcement in practice. For example, Chinese experts have confirmed that the lack of intergovernmental enforcement has meant not all new Chinese-produced cars on the roads meet the required idling speed emission requirements (Shen, Zhuang, & Fan, 1999).

If new car models exceeding the current national emission standards are allowed to enter the market it is not simply a sign of weakness in the vehicle emission management system, but also inherent vagueness in the national Air Pollution Control Law (APCL). Within Beijing’s version of the APCL, Article 32 stipulates that emissions from motor vehicles cannot exceed the standards and no work unit or private company can manufacture, sell, or import motor vehicles that exceed the standards. Article 53—Legal Responsibilities—mandates that if anyone violates Article 32, the monitoring department will stop the illegal action, confiscate the illegal property, and fine the company less than twice the profit. However, there is no clause in the law explaining which government department is in charge of investigating the production facility or who is responsible for issuing the penalty. When I raised this question during an interview with a Beijing EPB Ambient Air Management Division official, the answer was equally vague. Beijing’s APCL appears to lack clear definitions concerning the duties of each department so there is a great reluctance to assume responsibility. The official expressed serious concern over the lack of transparency of the governing bodies ensuring ecological liability in the auto-manufacturing sector; “this is the major flaw in the vehicle emission management system.”¹

A report published by the Policy Research Center for SEPA highlighted that new vehicle emission control regulations are not in the form of laws, but rather that they are “reflected in sectoral management;” the sector authorities are the vehicle producers themselves. Therefore, the basis for controlling emissions depends on self-inspection by producers (Policy Research Center, 2001). In China, vehicle emission standards focus on discharges rather than on the design of specific technologies. Factories can use cheap parts and they are free to choose the technology, which can impact the emissions. There is no control over the life-cycle of products or control of the procedures that go into design. Regulations also do not mandate durability requirements so emission performance deteriorates in a large number of vehicles soon after they leave the manufacturer (Sun & Zhao, 2001). Emission standards for new vehicles are not accompanied by certification, recall, or warranty requirements. Another missing link in the regulatory regime is the lack of clarity on enforcement and inspections. According to the requirements of the State Bureau of Technology Supervision, the Ministry of Mechanical Industry will organize uniform supervision and inspection on the quality of vehicles, but at the time of this writing, the regulation was not yet implemented.

While the government in Beijing may have the authority to dictate policy, it does not have the means to effectively punish transgressors. Paradoxically, three large municipalities—Beijing, Guangzhou, and Shanghai—have taken advantage of this lack of central control to impose more, not less, environmental standards to lower auto emissions. In all three cities, official responsibility for vehicle emissions control has been transferred from the Public Security Division of the Transportation Department to the environmental protection bureau (EPB). Institutional changes have caused a shift in control that has empowered their EPBs to make these stricter policies work. Notably, these three cities have pushed key government agencies to work with the EPBs, which has enabled them to begin effectively addressing the problem of deteriorating urban air quality.

THREE INNOVATIVE CITIES

Aiming for Green Games—Beijing

Both the hope to secure the 2008 Olympic Games and the desire to check the environmental consequences of rapid motorization were the driving forces behind stepped-up measures to reduce traffic-induced emissions in the capital over the last decade. It has not

been easy for the city to establish more stringent air pollution control requirements. The central government permits local governments to impose stricter standards from national laws only when pollution concentration levels for PM₁₀, SO₂, and NO_x are worse than China National Air Quality 3rd Class Standards. The State Council allowed Beijing a variance to national law and priority in environmental protection in 1998 only after a wait of six months.²

Beijing officials chose to take advantage of a rule stated in the PRC Air Pollution Control Law and Beijing Official Procedure for Prevention of Vehicle Exhaust Gas, whereby the municipal EPB has the responsibility of supervising the emission situation of vehicles for sale in Beijing. The Beijing EPB now conducts its own selective inspection of mass-produced cars on the market. Models failing to meet the Beijing EPB's standards, which are stricter than national ones, will not be on the list of permissible vehicles to be sold or driven in the city, even if the same model passed SEPA's test ("Beijing Tougher," 2002).

In effect, Beijing has granted itself an exemption to national law allowing it to set more stringent emissions standards. The central government has not ruled that Beijing has overstepped its authority although its rules have the effect of dictating higher fuel efficiency standards. The situation has similarities to a current U.S. environmental policy debate. The 1967 U.S. Clean Air Act (CAA) ruled against state-established automobile emission standards because of the inefficiencies the vehicle market would encounter. However, Congress wrote an exemption to CAA allowing California to adopt stricter air quality standards.³ Individual states must now adopt either the EPA's national auto emissions standards or the California low emissions vehicle (LEV) emissions standards.⁴

Playing Number Games—Shanghai

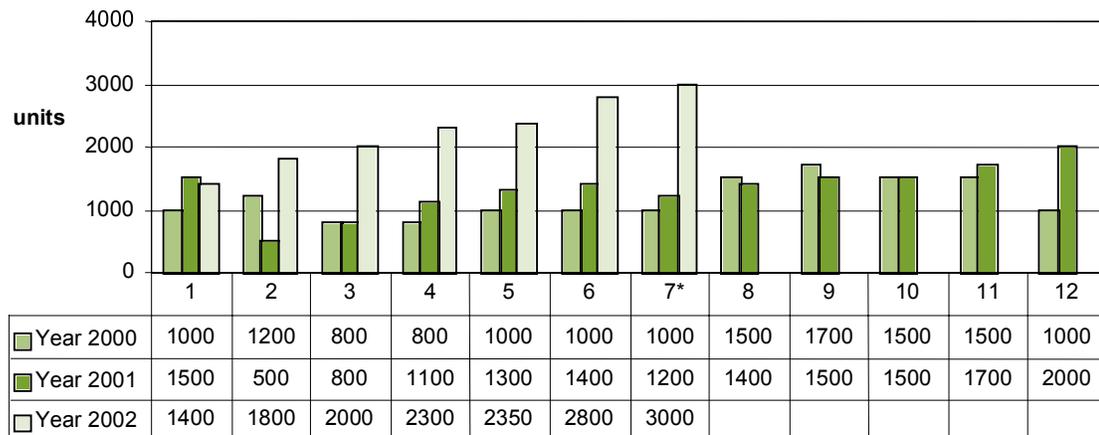
Shanghai, like Beijing, has chosen to regulate the cars on its streets to control traffic pollution, but unlike the capital it has decided to restrict the number of vehicles sold each month. Despite a 1990 directive from the State Council banning restrictions on inter-provincial trade and prohibiting any indigenous policies regarding industries, a Private License Plates for Auction policy was implemented in 1997 (Bezlova, 2000). Shanghai's policy is also at variance with the 1994 Auto Industry Development policy that seeks to foster individual ownership of cars and abolish government control of vehicle purchases (Stares & Liu, 1996).

The process of buying a private car through the auctioning program is a great inconvenience to both buyers and sellers. The monthly auction is held in Songjiang district, in a remote location outside the city limits. At the time of this writing, the subway did not reach the site and the distance from the downtown Shanghai to the exhibition center is considerable, even by Chinese standards. The silent auction starts at 9:00 in the morning—a person has one chance to submit a computer bid and, since the number of plates available and the lowest winning price are predetermined, it is important to arrive early to place a bid before the numbers run out. The whole affair is rather exciting, with expensive sports cars and SUVs on display, sales agents racing to launch new models, professional bidders from the car companies, and a thriving black market of sellers and buyers of license plates in violation of the legal price control.⁵ While some are profiting on the side from this auction, overall this licensing system has slowed the growth of cars on Shanghai's roads by only gradually increasing the number of licenses available each month. (See Figure 1). As a sobering comparison, Beijing adds 1,000 cars to the road daily.

// **...overall the licensing system has slowed the growth of cars on Shanghai's roads...as a sobering comparison, Beijing adds 1,000 cars to the road daily.**

While counter to the central government's auto development policy in spirit, the private car limitation measure is not an official violation as long as the city's objective is to limit the number of vehicles per year and does not discriminate against any particular car company or violate WTO agreements.⁶ Rather it is a legal loophole because there is no law on the books that directly prohibits a city from taking strong actions to improve transportation conditions.⁷ This strongly suggests that the central government seems to permit local governments more independence in establishing transportation regulations that suit local circumstances, than in enacting local legislation to prevent environmental degradation. For example, Beijing's closest neighbor, the city of Tianjin failed in its application for special

FIGURE 1: Number of Car License Plates Available for Bid Per Month in Shanghai



Source: Xinbao Auto Week June 24, 2002

* July 2002 author estimate

air quality standards in 2000 because the city's air was not considered bad enough.⁸ While local and central authorities are passing legislation to achieve the same broad objective of improving air quality, the innovative local governments are doing better than SEPA.

Putting the EPB into the Game—Guangzhou

Guangzhou has chosen to formulate a new and comprehensive development strategy in response to the many facets contributing to deteriorating urban air quality in its region. The strategy includes: (1) establishing an Interagency Cooperative Department to facilitate communication between the municipal EPB and city government; (2) widening the definition of vehicles subject to emissions standards to include military vehicles; (3) encouraging public transport, while simultaneously; (4) discouraging the use of bicycles on city center roads.

Interagency Communication. The Interagency Cooperative Department (ICD), which brings the municipal EPB into the daily routine of city planning at all levels, is strategically located behind the wall of the municipal compound Guangzhou residents call City Hall. In contrast, the EPB and transportation departments in Beijing and (until recently) Shanghai are located approximately one hour's travel apart.⁹ By making regular meetings easier, the ICD

established a setting more conducive to integrating environmental concerns into local decision-making, particularly over auto emissions.

Including the Military. In a daring act that would have once been unthinkable in China, the Guangzhou EPB now feels it necessary to evaluate military vehicles for emissions.¹⁰ Such non-uniform procedures have the effect of increasing, somewhat dramatically, the functional capacity of the existing pollution control network, since the PLA and Chinese officials comprise as much as 40 percent of the users who travel the expressway linking Shenzhen and Guangzhou (Turley, 1998).¹¹ Involving the military in the regulatory arena is especially advantageous since its service units and enterprises have been singled out in the past as major obstacles to effective enforcement of environmental regulations (Tang, Tang & Prakash, 1998).

Public Transport. Guangzhou also has put public transportation high on its agenda. Passengers carried on public transport per capita increased by 120 percent over the past decade, an impressive figure compared to the 20 percent increase in Beijing, the 9 percent decrease in Chongqing, and the 49 percent decrease in Shanghai.¹² Guangdong's increase in public transport load is a considerable achievement not only in China, but also internationally.

Discouraging Bicycle Use. In contrast to Beijing, where attempts to build new roads in the city without the obligatory bike paths were defeated by popular protests, the Guangzhou government has actively sought to decrease bicycle use within the city. Bicycles are prohibited on many of the upgraded city center roads, and almost all new roads are built without segregated bicycle lanes. High overpasses with gradients have severed established bike routes. As a result, the number of bicycle trips in Guangzhou dropped from 34 percent in the late 1980s to 20 percent in 1998 (Ernst & Hook, 2002).

CONCLUSION

As China continues to evolve away from centralized pollution policies to an environmental governance system that encompasses broader participation, the importance of recognizing the role progressive cities could play in environmental protection becomes clear. The central government has adopted unified emissions controls for motor vehicles. However, the above discussion of Beijing, Shanghai, and Guangdong suggests that some cities are taking advantage of the gray area between local and central authority in environmental affairs to implement transportation policies that have had a positive effect on controlling vehicular emissions. It merits mention that while these three cities circumvented national air quality policies to devise stricter measures, most Chinese cities avoid enforcing the central government's looser standards. However, the new models of local collaboration and innovation being devised in Beijing, Shanghai, and Guangdong do offer some useful models that other cities could emulate. In short, innovative local governments can provide valuable models to central policymakers as they seek new approaches to slowing vehicle pollution throughout the country.

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REFERENCES

Beijing Statistical Bureau. (Annual). *Beijing Statistical Yearbook*. Beijing: State Statistical Publishing House.

"Beijing to Introduce Tougher Auto Emission Standards," *People's Daily*. (1 August 2002). [Online]. Available: www.english.peopledaily.com.cn.

Bezlova, Antoaneta. (2000, January 15). "Cars in collision on China's free-market highway," *Asia Times*, [Online]. Available: www.atimes.com/China

Chongqing Statistical Bureau. (Annual). *Chongqing Statistical Yearbook*. Beijing: China Statistical Publishing House.

Guangdong Statistical Bureau. (Annual). *Guangdong Statistical Yearbook*. Beijing: China Statistical Publishing House.

Ernst, John and Walter Hook. (2002). *Making World Bank Transport Lending Sustainable: Lessons From the Guangzhou City Center Transport Project*. [Online]. Available: www.itdp.org

Gallagher, Kelly & Hongyan H. Oliver. (2005, July 15). *Providing low-sulfur fuels for transportation use: Policy options and financing strategies in the Chinese context*. Paper presented at SEPA-EPA International Workshop on Low Sulfur Fuel Strategies for China, Beijing.

National Research Council. (2006). *State and Federal Standards for Mobile Source Emissions*. Washington D.C.: National Academies Press.

Policy Research Center for Environment and Economy of State Environmental Protection Administration. (2001). *New countermeasure for Air Pollution Control in China: Final Report*. Beijing: Beijing State Environmental Protection Administration.

Schlesinger, Robert. (2002, October 17). "A legal test Steers Mass. to new plan on low-pollution cars," *Boston Globe*.

Shanghai Statistical Bureau. (Annual). *Shanghai Statistical Yearbook*. Beijing: China Statistical Publishing House.

Shen Dixin, Zhuang Yahui, and Fan Xiuying. (1999). "Road transport and urban air quality in China." *Journal of Environmental Sciences*, 11 (3): 350-354.

Stares, Stephen & Liu Zhi. (Eds.). (1996). *China's urban transport development strategy*. Proceedings of a Symposium in Beijing, 8-10 November 1995. *World Bank Discussion Paper* No. 352. Washington D.C.: World Bank.

State Statistical Bureau. Annual. *China Statistical Yearbook*. Beijing: State Statistical Publishing House.

Sun Qiang & Zhao Shengjun. (2001). "Study on policy of motor vehicle pollution prevention." *Jiaotong Huanjing Baohu. (Transportation and Environmental Protection)*, 22 (4): 25-27. (In Chinese).

Tang Shuiyan, Tang Chingping, & Vandana Prakash. (1998). "Local enforcement of pollution control regulations in developing countries: A comparison of Guangzhou, Delhi, and Taipei," Paper presented for presentation at the Annual Conference of the Association for Public Policy Analysis and Management, New York.

Turley, Alan. (1998). "China highway construction industry." *Industry Sector Analysis*. Washington D.C.: U.S. Department of State.

Zhang Shiqiu. (2001). "Environmental regulatory and policy framework in China: An overview." *Journal of Environmental Sciences*, 13 (1): 122-128.

NOTES

1. Interview with Environmental Protection Bureau official, 29 April 2002, Beijing.

2. Interview with Vice-Director Senior Engineer, Ambient Air Management Division, Beijing Municipal Environmental Protection Bureau, 9 August 2002.

3. A 2006 National Research Council (NRC, 2006) report deemed California's pioneering role in programs on fuel composition, regulation of individual motorists' use of their automobiles, and controls on transportation infrastructure planning good for the nation despite the additional risks and costs of design, production and distribution.

4. In 2002, the Bush administration opposed Massachusetts' adoption of California's amendment to the LEV program to regulate carbon dioxide, which was not defined as a polluting substance as defined by the CAA in 1967 (Schlesinger, 2002).

5. Commentary based on personal interviews conducted at the 22 June 2002 "Shanghai Car Market Trading Day" and the author's participation in the silent auction.

6. Interview with Director Section Member Senior Engineer, Science and Education Department, Shanghai Urban Transport Bureau, 19 June 2002.

7. Interview with Deputy Director Division of Air Pollution and Noise Control, SEPA, 20 July 2005.

8. Interview with Director, Division of Air Environmental Protection, Tianjin EPB, 9 July 2002.

9. The EPB in Shanghai has moved considerably closer to the Transportation Department since the time of this initial writing.

10. Interview with Director, Engineer, Guangzhou EPB, 24 July 2002.

11. This estimate refers specifically to Chinese officials and People's Liberation Army officials who use the Hopewell Highway, a six-lane 123 kilometer expressway linking Shenzhen with Guangzhou.

12. Conclusion drawn from examining various years of municipal statistical yearbooks from Shanghai, Chongqing, and Beijing.

Public Participation with Chinese Characteristics

By Margret J. Kim and Robert E. Jones

Political co-determination should be part of any socialist democracy...I am not one to put on a show just to look democratic to the outside (but) we need a law that enables and guarantees public participation, especially when it comes to environmental projects.

Pan Yue

Vice Minister of China's State
Environmental Protection Administration¹

The mood of the training room is almost always the same—an orderly scene of desks and chairs all neatly lined up with everyone looking appropriately serious, sipping the ubiquitous *lǜ chá* (with the annoyingly ever-present floating tea leaves), struggling to hold tiny paper cups that are invariably too hot. The venues vary by city—from grand banquet halls to converted discos, their crystal balls and other paraphernalia providing a striking, if somewhat incongruous backdrop. At one workshop in Xinjiang, our presentation was even accompanied by the latest “soap,” quietly emanating from a TV behind the tattered curtains surrounding the sound technician.

Surprisingly, the meetings often commence with a Chinese official's grandiloquent description of the seminal events of the U.S. environmental movement, quoting excerpts from Rachel Carson's *Silent Spring*, boosting our hopes that the audience of environmental protection officials and consultants will be well primed and ready to embrace what we are about to present. At the workshops, which typically run for 2 to 3 days, we are always reminded of the Asian learning style of rote memory, as the audience stares unblinkingly, seemingly transfixed, without so much as a single question. Sometimes the atmosphere warms up when a few courageous souls cast off their reticence and engage in some enthusiastic interaction, but most times halfway through the presentations we begin to wonder if our stone

quiet audience is absorbing any of the material. One can never tell, as most in the room will not open up so quickly to share their opinions, perhaps out of politeness and deference to their foreign guests—rather ironic to say the least, as the workshops are all about public participation. It is at this point we begin pondering whether we are wasting our time.

Despite the subdued workshops we do not think we are wasting our time, for promoting public participation is key to improving the environment in China. China's many environmental laws are increasingly embracing progressive market measures. While the concept of leapfrogging to cutting edge environmental tools is appealing to Chinese policymakers and international advisors alike, looking to the market as the key to solving China's environmental woes is not the answer, not without a fundamental commitment to a high level of transparency and public participation to ensure reliable compliance and enforcement.

Chinese officials often use a “cafeteria approach,” choosing from “foreign experts” bits and pieces of advice that they deem most desirable and oftentimes succumbing to the blandishments of the latest quick fix. But, can this approach be effective when different foreign experts introduce seemingly conflicting methods for public participation, causing further confusion to an already complicated concept? For example, some non-U.S. systems endorse “qualified or selective participation” while others limit the

public's involvement to post-decision on the project for possible mitigation only.

China stands at an important crossroads and its success in increasing public voice in the environmental sphere will depend largely on the government's underlying objectives for promoting public participation. Namely, are officials simply interested in maintaining control over the outcome or *really* encouraging independent views and healthy debate? China's political culture is one in which citizens have not traditionally had a strong voice in policymaking, however, recent policy pronouncements, such as the Eleventh Five-Year Plan, encourage more public participation in building China's "socialist democracy."

In our workshops throughout China, we have learned that there are two major challenges to instituting public participation mechanisms: (1) Chinese government officials and researchers struggle with the concept of the public's *right* to participate and (2) there are many political and cultural obstacles that potentially hinder the *process* of public participation. International and Chinese organizations interested in promoting public participation in China must understand these obstacles to promoting the public's right and creating a sound process. Below we use insights gained at numerous workshops to evaluate how China is progressing in setting up the basic rights and processes needed to create a more participatory environmental governance system.

THE PUBLIC'S RIGHT TO PARTICIPATE

The public should have a say about government actions that affect their lives before decisions are made. This basic right forms the foundation for the whole public participation process, but is not completely embraced yet in China. During a meeting to discuss promoting the concept of public participation at a well-known university in Shanghai, we were harangued by a professor about the futility of involving the public in environmental decision-making. In a state of near hysteria she lectured us by saying, "after all, what does the public know? We set the pollution standards and that's that. In fact, they don't even want to know." She went on to warn us, shaking her finger, that we couldn't "do that kind of business in China." Elitism is obviously alive and well in China.

Many Chinese policymakers and academics appear to view the public participation process as a formality, without giving much thought to the purpose. Core to public participation in environmental

decision-making in the United States is that it takes place sufficiently before an action is taken. However, in China hearings soliciting public opinion are invariably called either too late or after decision-makers have more or less made up their minds. In training workshops for environmental officials and environmental impact assessment (EIA) consultants, our description of the public participation process in California, with the emphasis on early outreach, is often met with blank stares. While some in the audience are impressed, others cannot conceive of the time-consuming planning that goes into the process of involving the public and the fact that holding just one public hearing will not suffice.

Anyone—not just select individuals—should be allowed to participate in public hearings. The biggest question and debate at workshops has been who should be invited to government hearings and give input about environmental policies or EIAs? At a workshop in Shenyang, a Q&A continued on this topic for about 30 minutes until the stunned participants finally comprehended that in the United States "anyone" could participate. This idea strikes most Chinese officials as being incomprehensible if not downright ludicrous. In China, depending on the type of forum, only a select number of people may participate. Although, it was refreshing to hear some academics argue in favor of inclusiveness (even though they themselves belong to the privileged classes) by admitting that they would not be able to appreciate the actual impact on the ground. When asked why participation should be limited and whether decisions to select who may participate should be discretionary, most answers were surprisingly based on practicalities—resources (the lack thereof), time, and cost. For example, how to physically accommodate large numbers of people? Of course, in the United States that is the reason why government agencies hold multiple meetings and hearings at different locations. In their desire to be practical, our wary workshop participants fail to understand how broader participation could prevent serious and costly policy mistakes. As they continue to experiment with the process, however, we are confident they will realize that citizens have a lot to contribute.

The public should be allowed to participate in a meaningful manner. In order to participate meaningfully, the public must have access to relevant information and have the needed resources to fully comprehend the consequences of the

decision. China is still in its infancy in providing sufficient reports and documents to enable the public to meaningfully participate in EIA proceedings. The concept of providing more than “notice-style” information is also very novel. Disclosure laws requiring open access to government information are either narrow in scope or yet to be properly implemented. Our workshop participants often ask how to deal with “state secrets” as they are broadly defined in China, with some joking that virtually anything could be one. The sad irony is that limiting access to relevant reports defeats the main objective of EIAs, which is to disclose to decision-makers and the public the significant environmental effect of the proposed activities.

THE ADVANTAGES OF INVOLVING THE PUBLIC IN THE POLICY AND REGULATORY PROCESSES

Public participation informs and encourages active contribution to government decision-making. In China, decision-makers focus more on “informing” than “consulting” the public. While informing is a critical step, it is essentially only a one-way form of communication. Many Chinese officials are uneasy about interacting with the public at EIA hearings because they fear it could actually lead to changing decisions that have already been made. Public participation is also often perceived by officials and project owners as simply the need to satisfy the people, rather than satisfy the legal standards and process to support the decision. A common worry at workshops is, “how can we please everyone?” Our response has been to stress that the process is not about whether government surrenders to the public’s demands but rather, that their comments are given serious consideration in making the decision based on law. Moreover, decision-makers need to communicate back to the community explaining why their comments were or were not adopted. Many officials are relieved to learn that the process allows “realistic expectations” to be relayed to the public, and that the agency still makes the final decision.

The public participation process encourages flexibility and facilitates broad involvement of citizens. Methods and guidelines that are being introduced in China to encourage public participation in EIAs are inclined to limit not only who may participate, but when and how. For example, the use of a single opinion survey by urban environmental protection

Many Chinese officials are uneasy about interacting with the public at EIA hearings because they fear it could actually lead to changing decisions that have already been made.

bureaus as well as project owners to gather public comment for EIAs, while very helpful at the beginning of the process when seeking input to design an outreach plan, certainly should not suffice as the only means for the public to comment. Moreover, seeking frequent input as people become more educated and familiar with the proposed project is crucial. At this time, Chinese officials appear to be more obsessed with the form rather than content of public participation for EIAs, as evidenced by the lack of flexibility and time allocated to conducting participatory activities. At workshops, most participants cited convenience as the reason the public’s answers were usually confined or pre-scripted. While this limited form of participation may be a convenient tool at this stage, as organizations and agencies struggle to deal with unsophisticated participants, only asking the public to engage in a narrow band of questions and issues creates the potential for a manipulation of the process to only support agency decisions.

The process should communicate to participants how their input was used in decision-making. Feedback to the public is perhaps the most critical part of the process because if citizens have no confidence their comments are being taken seriously, they will resort to other actions—such as violence or suing—and ignore the process completely. Typically, all relevant and significant comments should be addressed and there are ways to organize voluminous comments. Chinese officials are still experimenting with how to determine whether comments are valid or what criteria they should adopt for accepting or rejecting comments.

The public participation process should foster sensitivity towards low income and minority communities. China’s economic reform has outpaced social infrastructure development, resulting in serious

shortcomings in the institutional support that is necessary to deal with growing environmental degradation, especially in poor rural areas, where people feel their livelihood has been snatched away. The Chinese government has admitted growing concern regarding the rural unrest with pollution, with over 600,000 letters and visits of citizens to environmental officials in 2004. Nationwide the government recorded 87,000 mass protests in 2005, many of which were sparked by land grabs by local governments, closing factories, and increasingly, environmental pollution.² To help diffuse this escalating situation, many in the Chinese government are seeing the advantage of increasing the public's voice in environmental governance. For example, in early 2006, SEPA passed regulations on public participation for EIAs, which is a promising development. While it may be premature to introduce the concept of environmental justice, which typically deals with unfair environmental impacts on low income and minority communities, we found many environmental officials in China receptive to this idea and the use of social impact assessments (SIAs). Shell China Ltd. conducted extensive EIAs and SIAs in the construction of the 4,000-kilometer West-East Gas Pipeline project, which was groundbreaking for infrastructure planning in China. Expanding such a process to all infrastructure projects may be too ambitious at this stage, but will clearly serve as a useful tool in the future for China.

FURTHER THOUGHTS

Encouraging Central Government Commitment and Support.

Most local officials in China are risk-averse, more interested in maintaining the status quo rather than experimenting with a new and unfamiliar approach of introducing the public into their decision-making. Therefore, there is little incentive for change without strong commitment by the central government encouraging enforcement at the provincial and local levels. Inspired leadership from the dauntless SEPA Vice Minister Pan Yue will be essential in keeping the momentum for public participation. For those involved in giving policy advice at the highest level, it is important to continue emphasizing the benefits of public participation in achieving China's stated goals. Unlike quick technological solutions that can be adopted overnight, the implementation of the public participation process demands a steep, and time-consuming learning curve.

Promoting Versatile Capacity Building

Capacity building is essential because the new participatory approach in EIAs is a significant departure from the previously closed decision-making process. Currently, there is a chronic lack of capacity at the implementation level, disempowering even the most willing local officials. One senior EPB official in Jiangsu brilliantly described this challenge:

To be truly effective, we need a long-term and region-wide planning, rather than a project-by-project focus. But the public's educational level is too low to appreciate the environment and we (EPBs) lack even the basic expertise to collect and analyze data, let alone have the ability to conduct extensive research on the impact.

Significantly more resources need to be allocated on an ongoing and flexible basis to increase education, skills, and experience necessary to satisfy local needs to carry out the new public participation regulations for EIAs at all levels of government (as well as for consultants and NGOs). Moreover, there must be horizontal cooperation among different ministries and agencies. Some ministries are wary of the EIA public participation process as a means for SEPA to usurp their authority. Thus, international experts involved in EIA hearing and related capacity building work may want to encourage inclusive training over a broad cross section of government departments to overcome vertical and horizontal bureaucratic turf battles.

Overcoming Historical Associations and Preconceptions

One major obstacle to introducing a new participatory process is the lack of clarity in the meaning of participation. Chinese officials are unfamiliar with truly bottom-up public participation and attempts to create a more participatory environmental governance system could result in nothing more than old-style campaigns with hollow rhetoric and slogans. By way of example, misunderstanding the process related to EIAs as some sort of numbers game; an official at one of our workshops boasted that China has already conducted more EIAs (however inadequate) than any other country in the world.

In order for public participation to truly work, the community must have confidence in the process. This entails introducing the mechanics

but also shifting the mindset of officials and the public—the former think citizens will automatically defer to their views and the latter often fear retaliation for speaking out. SEPA is already expanding its public participation training beyond EPBs. At a workshop in Guiyang, we were surprised at the large number of consultants in attendance who were eager to engage and learn. Chinese NGOs are also calling for more public participation in environmental protection and government officials should respond by working with them to empower citizens. Such partnerships will lead to better government decision-making with wider support from the public.

CONCLUSION

While bumps are expected along the way (two steps forward, one step back), China cautiously continues its flirtation with public participation as a potential solution to an array of social and environmental problems. When introducing Western public participation concepts and tools, international experts should engage in a coordinated fashion, with utmost care and respect for cultural, historical, and political factors. While inclusive decision-making takes time, local government, stakeholders, and the public need to buy into the process to create a greater sense of ownership so that it can be effectively implemented. In closing, an over-zealous, evangelizing approach to public participation must be avoided at all costs, as this will be treated with suspicion and resentment and may be seen as part of an attempt

by the West to slow China's development. At the same time, a too generic, one-size-fits-all approach and one that is not adequately adapted to local circumstances, could have the disastrous effect of setting back China's embryonic public participation efforts by decades.

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NOTES

1. *Der Spiegel*, Interview of Minister Pan Yue by Andreas Lorenz on March 7, 2005
2. Jonathan Watts (2006, January 21). "Land seizures threaten social stability, warns China's leader" *The Guardian*. [Online]. Available: <http://www.guardian.co.uk/china/story/0,,1691804,00.html>.

SPOTLIGHT ON NGO ACTIVISM IN CHINA

Recent Developments at the Center for Legal Assistance to Pollution Victims (CLAPV)

By Xu Kezhu and Alex Wang

The Center for Legal Assistance to Pollution Victims (CLAPV) has garnered much attention in these pages in recent years (see *CES* issues 4, 5, and 6). Nonetheless, like all things in China these days, environmental litigation is a rapidly evolving area and what was written before requires an update. While CLAPV, founded in 1998, remains one of China's only nongovernmental organizations (NGOs) devoted to environmental litigation, the nature of its work has seen important shifts and expansion in the past two years.

Over the past few years CLAPV's staff has been busy; the center's legal assistance hotline, established on 1 November 1999, has serviced nearly 8,500 calls. Of the 74 legal cases CLAPV has taken on, 31 have resulted in victory or mediated settlements in favor of plaintiffs. In all, over 20,000 people from most parts of the country (excluding Tibet and Hainan Island) have received CLAPV's assistance.

While CLAPV continues to advise on legislation, train judges and lawyers, and carry out exchanges with international organizations—such as the Japan Environmental Council, Natural Resources Defense Council (NRDC), American Bar Association, and others—it also plans to expand its capacity to conduct outreach in rural areas most affected by pollution and to work more actively with the government to promote implementation of environmental laws. In the past two years, four significant trends have emerged in CLAPV's work:

(1) *Administrative law cases against environmental protection bureaus (EPBs) and other government agencies have increased.* It is axiomatic that enforcement of environmental laws in China has been poor. EPBs often do not enforce industry violations of environmental laws, and the bureaus themselves often do not comply with the law. Administrative litigation has been an indispensable tool in forcing government compliance with the law in many

countries, such as the United States. In China, litigation against administrative agencies is showing initial signs of promise. Even where cases have not resulted in judicial victories, administrative litigation has in some cases been responsible for creating the impetus for mediated results or other government action.

For example, with assistance from CLAPV, two farmers in Hebei Province sued the Dingzhou municipal EPB for illegal approval of an environmental impact assessment (EIA) document. Though the basic level court rejected the case on standing grounds, the litigation led directly to SEPA suspending the work unit that drafted the EIA for six months; the case is currently on appeal. Other examples of CLAPV-supported administrative lawsuits include:

- Beijing resident Zhang Shijun brought a case against the Beijing Dongcheng District Public Security Bureau (PSB) for failure to enforce noise pollution regulations. The lawsuit directly led to the PSB taking enforcement action and issuing an apology to the plaintiff.
- 182 residents of Panjiayuan South Village took the Beijing Planning Committee to court regarding its approval of a permit to construct an animal experimentation laboratory near a residential area. The basic level court held that the plan violated applicable regulations.
- Residents of Beijing Baiwangjiayuan have tried to sue the Beijing EPB for its approval of an EIA concerning a high voltage transmission line project. The plaintiffs seek cancellation of the EPB's approval of the project's EIA; the court has not yet reached a decision in this case. However, a separate case brought by residents against the Beijing Planning Commission was dismissed for lack of standing.



View of the Baiwangjiayuan high voltage transmission towers from the Summer Palace. © Bie Tao

(2) *Class action suits involving environmental pollution victims have increased in number.* Early cases supported by CLAPV tended to involve a single plaintiff or members of a single family bringing suit. The past two years have seen an increase in cases involving numerous plaintiffs against a common defendant. Cases have involved one or more villages and even entire counties. One of the most notable cases involved over 6,000 people from Panzihua municipality in Yanbian county, Sichuan Province, suing a single yellow phosphorous production plant for its air pollution. Class action suits ideally create the momentum and pressure to compel enterprises to make technological improvements or alter polluting behaviors. Moreover, they are vehicles for increasing public awareness of environmental laws and rights.

(3) *CLAPV is expanding its work to include cases seeking compensation for health impacts of environmental pollution.* In its early years, CLAPV largely focused on economic losses related to damage of private property, such as private fishery stocks or fruit orchards. The key barrier in human health-related cases is the difficulty of demonstrating the connection between pollution and health consequences. Additionally, China's legislation concerning compensation for loss from pollution is incomplete. As a result, calculations of losses and compensation, if any, typically lack legal basis.

(4) *CLAPV is exploring ways to address new forms of environmental harm that have arisen along with break-neck economic development and rising environmental awareness.* These new forms of harms include indoor air pollution (in homes and automobiles), impact from electromagnetic radiation (from high voltage cables), and various types of noise pollution.

As China continues to grow, so too will the scale and scope of environmental problems facing the country. CLAPV endeavors to evolve and adapt to these changes and continues to fulfill its mission of assisting those most vulnerable to the environmental consequences produced by China's growth.

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COMMENTARY

The Third Wave of China's Grassroots Environmental Movement: Regional Youth Environmental Organizations

By Wu Haoliang (Translated by Yan Baohua)

Chinese and international scholars and journalists have become increasingly interested in writing about China's expanding environmental movement, particularly focusing on registered and unregistered nongovernmental organizations (NGOs). China's NGOs have become more visible in recent years in their work to influence environmental policymaking, pushing for stricter enforcement of environmental impact assessments, and increasing the public's awareness of pollution and threats to biodiversity. In its first issue, the *China Environment Series* began focusing on China's fledgling NGOs, and in issue five highlighted what had been a relatively unknown second wave of green groups, namely the rapid growth of student environmental associations (SEAs) at universities across China.¹ This commentary calls attention to the third wave of China's environmental NGO movement—the development of regional youth environmental organizations (RYEOs, *diquxing qingnian huanbao zuzhi*). My years of work as an activist in one of the first RYEOs—Green Stone in Jiangsu Province—gives me a unique perspective on discussing the emergence and potential of RYEOs and how they reflect some important trends within the NGO movement in China.

In the 1990s, after the government extended political space to allow for NGO development, the early green groups were established by professionals (e.g., history professor Liang Congjie who founded Friends of Nature and sociologist Liao Xiaoyi who established Global Village Beijing). Since 2000, young people have begun creating NGOs, often after participating in SEAs at universities—Han Haisha and Green-Web are perhaps the most well-known NGOs created by recent university graduates. While RYEOs have been set up by young

people and are affiliated with SEAs, they represent a very new organizational model for grassroots activism in China.

THE ROOTS OF RYEOS

The university students who joined the huge wave of SEAs in the 1990s were very enthusiastic about carrying out environmental awareness raising projects both on and off campus. Their passion helped make SEAs an important player in strengthening China's environmental movement. RYEOs sprouted at around the beginning of the new century, when the explosion of SEAs slowed down (growing from 2 in 1985 to nearly 200 by 2000). One intrinsic weakness of these university green groups is the yearly personnel change as students graduate (Lu, 2003). Thus, the lack of a stable management and fundraising team inside the group has meant SEAs are constantly losing institutional memory and more seriously, facing difficulties in obtaining regular funding.

In the 1990s—before the emergence of RYEOs—a few student associations were formed to serve as platforms for SEAs to communicate and exchange information nationwide. Most notable were Green Student Forum (Beijing) and GreenSOS (Sichuan). Although they provided valuable support and inspiration to the development of the student environmental movement, the long-distance from the growing number of individual student groups needing their support posed challenges to the efficiency of their work. Thus, in 2000, perceptive students around the country began setting up RYEOs to provide support and services to university student groups within a certain locality (e.g., city, province, or region), rather than nationally.

Some of the early RYEOs were Shanghai Green Student Forum, Green Ark in Tianjin, and Student Environmental Front in Xi'an. While they started out as nonprofit organizations that specialized in providing support to college students and youth groups, many RYEOs have expanded their work to run their own environmental projects that involve the general public, as well as students. Within a time span of 6 years, about 20 RYEOs have developed in almost every province in China.

CAPACITY BUILDING ROLE OF RYEOs

Since RYEOs began to operate in 2000, they have helped support the growth of SEAs by: (1) disseminating information, (2) providing training and information exchange services to individual groups, (3) organizing joint activities among SEAs, and (4) becoming regranteeing organizations.

Information Dissemination and Training

- *Capacity building for student group leaders:* RYEOs make use of their experienced staff and outside experts to provide training opportunities for SEA leaders. These training sessions not only equip SEA leaders with knowledge in organizational management and project implementation, but also provide an opportunity to communicate and establish good relationships with people from other SEAs.
- *Forums, salons and lectures:* RYEOs often invite people from various student groups to come together to share their information and experiences at salons, informal discussion forums, and lectures.
- *Integrated website and bulletin board system:* RYEOs generally have more advanced technical capacities to construct and maintain websites than most SEA groups. SEAs often use a section on a RYEO website to post activity information and carry out bulletin board chats with members and other SEAs.
- *Disseminating and maintaining information:* RYEOs often gather and disseminate information valuable to student group development on grants and training activities, as well as maintain contact information on individual student groups in the region. They also sometimes store important SEA

documents (e.g., project plans and reports of individual SEAs), which could easily be lost during the yearly personnel changes.

Information Materials and Fundraising Support

Most SEAs lack office space and therefore have no storage for books, videos, and other supplies. RYEOs therefore have become important meeting places for nearby SEAs and over the years have accrued large book and video collections that SEA members can borrow for their work.

Many RYEOs are better in fundraising than individual student groups, which often lack the experience and English skills to complete grant applications. While some foundations have been interested in supporting China's student environmental movement, they view working with so many small SEAs too time-consuming and energy intensive. Therefore, foundations find it easier to award big grants to RYEOs, who regrant small funds to student groups. Some of the major foundations supporting China's student groups through RYEOs include Global Greengrants Fund, Pacific Environment, Siemenpuu Foundation, Asia Foundation, Conservation International, Wildlife Conservation Society, Ford Motor Company, and Green Stone Fund.²

Projects and Activities Support

Years of work with SEAs have given RYEO staff the insights to provide guidance and critique the activities student groups undertake. Sometimes RYEOs even organize large-scale projects or campaigns and encourage the student groups within their regions to participate. Besides providing SEAs with project ideas, these activities also serve as a training opportunity, for SEA leaders and key members learn the necessary skills for running a project. For example:

- For five years Green Stone, together with volunteers from local SEAs have carried out a number of activities aimed at protecting the rare Chinese swallowtail butterfly.
- For World Water Day in 2003, Xi'an Green Camp gathered its staff and more than 100 SEA volunteers to hold an exhibition and numerous education activities in a park in Xi'an.
- In 2004, Green Anhui initiated its long-term project to save the Huai River, one of the most polluted Chinese rivers, by organizing survey and

propaganda teams whose members were chosen from local SEAs.

- In February 2006, Green Camel Bell began to draft the first green map of Lanzhou city with a volunteer team comprised of local SEAs. (*Editor's Note: See feature box on this RYEO in this issue*)

RYEOs also coordinate activities among student groups. For example:

- In 2004, Guangxi College Students Green Union completed a campaign against disposable chopsticks by uniting ten SEAs together, resulting in cafeterias in each university banning their use.
- In 2005, with the support of Wildlife Conservation Society, Green Jilin Union coordinated eight SEAs from seven different universities to carry out a three-month propaganda campaign pushing for the protection of tigers in northeast China.
- At end of 2005, Green Henan called upon students in Zhengzhou universities to replace paper New Year's greeting cards with gifts of fruit. More than 4,000 fruit deliveries were sent out with the joint efforts of the SEAs.

UNEVEN GROWTH IN RYEOS

RYEOs can be found in almost every province in China, however, some only focus on urban areas, while others coordinate their assistance to SEAs (or carry out their own projects) across several different provinces. Although RYEOs are more evenly distributed around the country than NGOs (see Box 1), not all are equally strong organizations. Some of the stronger RYEOs have emerged in Jiangsu, Anhui, Zhejiang, Sichuan, and Shaanxi, where groups obtained support and official status from local governments (e.g., Zhejiang) or became stable through strong grassroots efforts (e.g., Anhui). Some RYEOs became stable only after undergoing a process of creation, disappearance, and reincarnation (e.g., Tianjin and Guangdong). Some regions have lacked the right "soil" for growing a civil society in the form of RYEOs. For example, RYEOs in Jiangxi and Guangxi fell apart shortly after being created due in part to a lack of local support. Some RYEOs have failed to stabilize despite continuous efforts by local environmentalists—examples of these kinds of stagnant groups include RYEOs

BOX 1. Geographical Distribution of China's RYEOs

NORTHEASTERN CHINA

Green Longjiang (Heilongjiang)
Jilin College Environmental Protection Union (a.k.a. Green Jilin)
Jilin Youth Environment Organization

NORTHERN CHINA

Green Student Forum (Beijing)
Tianjin College Environmental Protection Union
Green Henan
Shandong College Students Environmental Protection Union
Shanxi College Students Green Camp

CENTRAL CHINA

Wuhan Green Fund (Hubei)
Hunan College Green Union

EASTERN CHINA

Green Anhui
Green Stone (Jiangsu)
Shanghai College Student Green Forum
Zhejiang College Student Green Forum

SOUTHERN CHINA

Guangdong Green Spot College Students Action Network

SOUTHWESTERN CHINA

Chongqing Youth Environmental Communication Center
GreenSOS (Sichuan)

NORTHWESTERN CHINA

Shaanxi Youth and Environment Mutual Promotion Network
Green Camel Bell (Gansu)
Xinjiang College Environmental Protection Volunteers Union

BOX 2. Development Status of Regional Youth Environmental Organizations

REGION	MATURE	ACTIVE	NEW	STAGNANT
Helongjiang		•		
Jilin (2 groups)			•	
Liaoning				•
Hebei				•
Beijing		•		
Tianjin			•	
Inner Mongolia				•
Shanxi (山西)		•		
Henan		•		
Shandong			•	
Hubei		•		
Anhui	•			
Jiangsu	•			
Shanghai		•		
Zhejiang	•			
Jiangxi				•
Fujian*			•	
Hunan			•	
Guangdong			•	
Guangxi				•
Hainan				•
Guizhou				•
Yunnan*			•	
Sichuan	•			
Chongqing (2)*			•	
Shaanxi(陕西)	•			
Ningxia				•
Gansu		•		
Xinjiang			•	
Qinghai				•
Tibet				•

*Note: There are three projects counted in this chart that are not listed in Box 1 because while they function somewhat like regional networks they are not yet formal RYEOs:

- (1) China Mangrove Protection Project carried out by student groups at various universities in Fujian and nearby provinces;
- (2) Youth Monthly Forum among SEAs in Yunnan; and (3) the long-running Training Program for Sustainable Development Leaders of College Students in Chongqing.

in Xinjiang, Shandong, and Hunan. Similarly, in Guizhou and Hebei, young aspiring environmentalists have considered establishing local RYEOs, however, to-date none have emerged. Box 2 categorizes the current 20 RYEOs into four groups according to their development status: (1) mature (stable for several years); (2) active (newly established, but very active and effective); (3) new (newly established, but unclear whether they will be strong);

and (4) stagnant (those that fail to form a network or have an unstable network).

RYEOs have typically taken one of two main development paths in forming their organization, either establishing themselves as: (1) informal network associations that have SEA members in decision-making roles or (2) independent and more formal, possibly registered, organizations that not only serve SEAs, but also carry out their own projects.

SPOTLIGHT ON NGO ACTIVISM IN CHINA

Green Camel Bell—A Regional Hub for Environmental Protection Efforts in Lanzhou

By Brendan Snow, Global Greengrants Fund



Students participating in a GCB education activity draw their vision of a beautiful environment for their hometown. © Wu Keyi

In 1999, environmental leader Liang Congjie, founder of Friends of Nature, wrote in a *Time* article about how Lanzhou (the capital city of Gansu Province) had earned the distinction of the most polluted city on earth. He lamented that in Lanzhou and other cities across China, few were concerned about the negative impact of unchecked industrialization, “until rivers stank of raw sewage and coal dust clogged the air.”¹ This degradation began in the 1960s when there were no advocates for the environment. Today, there is a burgeoning environmental movement, although nongovernmental organizations (NGOs) are not active in all provinces. For example, few independent registered NGOs operate in Lanzhou, but there is one notably active NGO, Green Camel Bell (GCB), that has worked to protect Gansu’s forests, wildlife, and rivers, as well as to raise environmental awareness and establish ties to like-minded groups in the province.

GCB began as a regional environmental youth organization (RYEO) that was organized in November 2004 by various university students who wanted to create a network for student environmental associations (SEAs) and advance environmental causes within Gansu and surrounding provinces. (*Editor’s Note: See commentary by Wu Haoliang on China’s RYEOs*). GCB acts as a regional hub and resource center through which environmental activists can expand their network and coordinate activities.

Global Greengrants Fund (GGF) has recognized the importance of GCB activities and given the group several grants for capacity building, advocacy, and overhead. A 2004 grant helped GCB obtain an office and carry out a “fruit for card” program that encouraged locals to give fruit instead of the usual holiday cards, in an effort to promote awareness about forest degradation and destruction. A 2005 grant helped them purchase a computer and initiate an online monthly newsletter.

In 2005 and 2006, GCB used GGF funds to: (1) distribute information and give public talks about the ethical treatment of animals at the Wuquan Mountain Zoo in Lanzhou; (2) research and publicize the effects of radioactive waste on the people and wildlife of Gansu; and (3) compile the most comprehensive library of ecological and environmental science materials in northwestern China.

GCB is making headway not only on the environmental protection front, but also is breaking down socio-cultural barriers in that GCB’s team is composed of the different ethnic groups found in northwestern China—Han, Tibetan, Hui, Mao, and Man. Since 2005, GCB staff has visited the Tibetan region of Gansu twice and developed a good relationship with Muslim communities throughout Lanzhou.

GCB is a true example of the success that grassroots environmental movements can achieve. What began as a few passionate students at universities sprinkled throughout Gansu Province has grown quickly into an environmental protection stronghold in that region.

For more information on Green Camel Bell please visit <http://www.greencambell.ngo.cn> or email info@greencambell.ngo.cn or greencambell@126.com.

NOTES

1. Liang Congjie. (September 27, 1999) “Most Polluted City on Earth,” *Time Asia*. [Online]. Available: <http://www.time.com/time/asia/magazine/99/0927/lanzhou.html>.

Informal Network Association

One typical informal network association RYEO is the Shanghai College Students Green Forum, which since 2000 has been serving as the main communication link for 18 university groups in Shanghai. It organizes regular meetings of green student volunteers and provides a single communication platform for joint activities among Shanghai SEAs—such as an environmental advertisement competition and a bird-caring week. Its executive committee and chair are elected representatives from SEAs. This decision-making structure is useful for soliciting broad input, but it does render the RYEO work process somewhat cumbersome, especially since SEA leaders change frequently.

One very powerful networking RYEO—Xi'an Green Camp, which recently changed its name to Shaanxi Youth and Environment Mutual Promotion Network—did not actually start out as a regional organization but rather began as a summer field trip project in 2001 for university students to learn more about desertification and forestry biodiversity. Over the years, the Xi'an Green Camp produced many excellent young environmental leaders, many of who wanted the camp to be more than a temporary holiday project. These leaders pushed it to function as a formal networking RYEO, establishing a board of directors and initiating a small grant program to fund SEAs. At the end of 2005, the camp merged with another new RYEO Green Silk, and became an integrated RYEO platform to serve SEAs and carry out environmental programs.

Independent RYEOs

Some RYEOs have gradually developed from networks into independent NGOs that run their own projects, doing work that parallels and complements SEAs. These types of RYEOs have been very stable and succeeded in attracting foundation grants, which they regrant to SEAs in their region. These more independent RYEOs are more like guides for SEAs, rather than just an information clearinghouse platform. The leaders of these RYEOs are able to work much more efficiently than those in informal network association RYEOs since they do not have to constantly consult all the SEA leaders.

The first truly independent RYEO to develop in China was Green Stone, which established its own team and office to provide training programs, seminars, and small grants to SEAs. It also began its own programs to conserve local wildlife and rivers and to hold broadly targeted environmental education

activities. Green Stone has become a leading model of RYEOs, and most recently has begun to provide small grants and other assistance to help in the development of new RYEOs.

Future Potential of RYEOs

Similar to other civil society organizations in China, RYEOs face several internal and external challenges. Due to the fact that RYEOs evolved out of student groups, they are often very informally organized, usually depending on periodic volunteers for implementation of projects. The lack of strong internal management and accounting systems means RYEOs are not always well organized or capable of creating long-term volunteer mechanisms or successful fundraising. Many would benefit from having a board of directors to assist in fundraising and pushing for a greater professionalization.

Externally, many RYEOs, like other NGOs in China, face the challenge of gaining a legal status. Only a few RYEOs have been officially recognized by registering as affiliation organizations or companies. Most RYEOs have not registered at all and their legal status remains vague. While staff turnover in RYEOs are not as frequent as that in SEAs, it is still a problem since most key staff are volunteer students. Thus, it will be important for RYEOs to follow Green Stone's example and have paid staff positions and obtain legal registration to become more professional and stable organizations that can carry out their own projects, as well as assist SEAs.

Since 2004, Green Stone, Xi'an Green Camp, and Green Zhejiang have organized three annual development conferences (in Nanjing, Xi'an, and Hangzhou) for RYEO leaders from around China. The goals of these meetings were to establish better cooperation and stronger networks for assisting each other. One major initiative to emerge from these efforts was the establishment of a communication website called GSEAN (Green Student Environmental Association Network at www.gsean.org).

As the youth are the future leaders of the country, Chinese RYEOs will become an increasingly important player in China's environmental movement. RYEOs are building stronger networks and training a growing number of young environmentalists, which are important resources for Chinese environmental NGOs. Most registered NGOs in China are located only in a handful of big cities, limiting their development potential. Partnering with RYEOs offers an opportunity for NGOs to expand networks nationwide. Moreover,

through countless training programs, RYEOs are producing a more professional “green” workforce for NGOs and government agencies to help improve China’s environmental protection efforts.

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NOTES

1. Lu Hongyan, “Bamboo Sprouts After the Rain: The History of University Student Environmental Associations in China.” *China Environment Series*, Issue 5 (2006).

2. Green Stone Fund is one of the most important funder of RYEOs, receiving grants from Finland’s Siemenpuu Foundation, which Green Stone then regrants.

Notes on Public Participation in Environmental Impact Assessments in China

By Lila Buckley

Stories of citizen participation in environmental impact assessment (EIA) processes have been making headlines in China over the past year. While these routine processes are not usually newsworthy events in developed countries, public participation in the environmental sphere has emerged as a new component of economic development in China—with nongovernmental organizations (NGOs) playing a crucial role. This commentary explores the experiences of one Chinese NGO, the Beijing-based Global Environmental Institute (GEI), and the reflections of its executive director—Mrs. Jin Jiaman—in collaborating with China's State Environmental Protection Administration (SEPA) to draft the new public participation laws for environmental impact assessments.

In early 2005, the World Bank reached an agreement with SEPA's EIA Center to carry out a "Public Participation in China" program. Because the program is aimed at creating regulations for public participation within the recently passed EIA Law, EIA Center staff knew it would be important to include at least one Chinese NGO in the team of regulation writers. At the same time, the staff felt that few NGOs possessed the capacity to provide effective input. GEI, however, had already assisted SEPA with EIA trainings at the local level and Jin Jiaman had previously worked at the Chinese Research Academy of Environmental Science, one of SEPA's main research centers. Thus, the EIA Center selected GEI as the sole NGO participant in the regulation-making team.

The first meeting in the fall of 2005 began with presentations by SEPA and the World Bank on how the public could be involved in the EIA process. The reactions to the presentations by the team were mixed. The development and construction

company representatives saw these regulations as very complicated (*fuzha*) and troublesome (*mafan*) and were thus not very supportive. The EIA firm participants supported the regulations, which they viewed as strengthening implementation of the EIA law and beneficial to their work.

Many participants were confused about the inclusion of an NGO in the process, in part due to unfamiliarity with the concept and function of an NGO. During the team discussions, Jin Jiaman's argument that true public participation included not just NGOs but multiple stakeholders was viewed as somewhat unrealistic. "It felt very lonely," recalls Jin, finding herself the sole NGO in an environment where her organization and ideas were viewed as a threat. "I began to wonder how we could really help the government achieve its goals when the very concepts of NGOs and public involvement in environmental regulations were so foreign." Moreover, for everyone in the room, the concept of public participation was a completely new experience. By the end of the first day Jin Jiaman felt somewhat frustrated. "While I felt the central government had very good intentions in writing these regulations," she remembers, "I knew that actually creating and enforcing strong public participation regulations would be a very long process."

This initial team dynamic was a microcosm of the challenges such regulations face in China, in an atmosphere where local governments and construction companies prioritize economic development—NGOs and the general public have little voice. Despite the team's steep learning curve, it did succeed in producing draft regulations that were issued by SEPA on 18 March 2006 after integrating feedback received from the public. The *Interim Public Participation Law for Environmental Impact*

Assessments formulated the goals and scope of public participation and clarified the rights and obligations of the developers, environmental groups, and the public. While it represented a significant step forward for the country's sustainable and equitable development, the new EIA regulations are but one step in what has been a "work in progress" for nearly twenty-seven years.

THE LONG ROAD TO ENVIRONMENTAL IMPACT ASSESSMENTS

As China's rapid industrialization and economic expansion over the past several decades has created many of the same environmental problems faced by developed countries around the world, Chinese leaders have begun to recognize the value of the EIA mechanism in promoting more sustainable development and defusing conflict. In China, the EIA concept first entered policy in 1979 as part of the national Environmental Protection Law (EPL). However, the inclusion of EIA in the EPL proved to be pure rhetoric, providing no concrete stipulations or methodologies.

Without clear definitions, the call for EIAs was ignored. Another seventeen years of blind economic growth took a heavy toll on China's resources before the concept of EIA was reintroduced. In 1996, the State Council formulated new legislation for EIAs: Article Two of the *Rules and Regulations for Management of Environmental Protection in Construction Projects* detailed a provision for EIAs, thereby becoming the first legal basis for the real implementation of EIAs. While this was a major step forward, the law only addressed construction projects, with limited requirements for technical, predictive reporting; it lacked a solution-oriented approach needed for meaningful ecological protection and included no provisions for public input.

Public Participation Policy in Fits and Starts

By the late 1980s, environmental officials were starting to recognize the limitations of government and corporations in addressing increasingly severe pollution and ecosystem destruction. They began to look towards civil society to help strengthen environmental protection efforts. It was in this context that the principle of public participation in environmental policymaking was put forth. On 26 December 1989, a new Article Six of the EPL

clearly stated, "All companies and individuals have a duty for environmental protection, and have the right and authority to report and bring suit to those companies and individuals committing environmental damage and pollution." This represented an important first statement of individual environmental rights in Chinese law. However, as with the first mention of EIAs in the 1979 EPL, these regulations were merely a set of principles and carried no concrete rules or methodology for implementation.

Under the 1994 law that permitted the registration of NGOs, the first groups to be formed were "green groups" so public participation in the environmental sphere was given a legitimate access point. The growing activism of NGOs and increased pollution protests around China contributed to the push towards more specific provisions for public EIA participation in new legislation. This occurred in the 2002 amendment to the EPL. The amendment stipulates that, "the Country will support companies, experts and the public in using appropriate methods to participate in environmental impact assessments." It also addresses the concepts of stakeholder forums, public hearings and other methods of public participation.

In September 2003, China passed a new EIA Law that was a significant departure from the earlier draft. The new law broadened the scope of EIAs to include all development and construction projects, and legally secured the public's right to conduct analysis, prediction, and evaluation of environmental impacts from construction projects and plans. With EIAs now required for all projects and procedures, and protections for the right to public participation in the assessment process, the conceptual framework was set for a meaningful implementation of EIAs. The World Bank and EIA Center work helped create clear procedures and implementation guidelines so vital to public participation in EIAs.

CHINESE NGO INVOLVEMENT IN PUBLIC PARTICIPATION POLICY FOR EIA

Now that EIAs and public participation rules exist on paper, the hard work of building EIA capacity in many sectors of society is beginning. As civil-society entities with the ability to gather resources and professional expertise, NGOs will be crucial to the EIA public participation process. Unfortunately, Chinese environmental NGOs are still quite young,

SPOTLIGHT ON NGO ACTIVISM IN CHINA

Global Environment Institute

By Lila Buckley

Using its strong dual focus on research and on-the-ground projects, the Global Environmental Institute (GEI) is working to redefine environmental protection in China to include financial mechanisms and new models of sustainable development. Founded in Beijing in March 2004 and led by Jin Jiaman, a twenty-four year veteran of the Chinese environmental movement, GEI's mission is to provide market-based models for solving environmental problems in order to achieve development that is economically, ecologically and socially sustainable. GEI's approach is collaborative, working with domestic and international experts, governmental and nongovernmental organizations, businesses, and farmers. GEI's research and project work spans five programs: (1) energy and climate change, (2) biodiversity conservation, (3) rural development, (4) capacity building, and (5) partnerships.

An example of the power of GEI's approach can be seen in the quiet village of Changshui in Yunnan Province, where the organization has transformed a once energy-poor, polluted farming community into a prosperous integrated sustainable agricultural system. The project, supported by the Blue Moon Fund, collects cow manure in inexpensive, easy-to-use upfloating biogas tanks that produce fuel for cooking and heating. This free renewable energy eliminates the burden of high gas prices for the villagers and avoids putting pressure on local forest resources for fuel. The composted manure is then used as an organic fertilizer for a variety of vegetable crops. The two-year old project has resolved the village's manure pollution problem, replaced firewood for fuel, and provided fertilizer for their organic produce. It has also produced a twenty-fold increase in the income of local farmers, who now have healthier yields and are able to tap into lucrative organic food markets to sell their crops. This model for ecologically sustainable development incorporates vegetation, animal husbandry,



Changshui villager gathers composted organic manure from the biogas tanks to fertilize her fields.
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and horticulture, while meeting the energy and economic requirements of the region. GEI is in the process of replicating the model in villages throughout Yunnan, Guilin, Tibet, and Sri Lanka.

GEI's continued success is based on its fundamental belief that each project must have a sustainable home in both the market and a supportive community. GEI's novel approach signals a bright future for partnership and collaboration in the environmental field in China.

For more information please see www.geichina.org or contact Lila Buckley, assistant executive director, at lila@geichina.org.

and largely focused on education and outreach. Most of them lack the specialized legal knowledge to advocate or provide assistance in the EIA process. However, a growing number of international NGOs are bringing EIA training to China, targeting domestic NGOs, lawyers, and local government officials. Such trainings could help domestic NGOs build capacity to enable individuals and institutions to better anticipate, plan, and manage the consequences of development.

// Now that EIAs and public participation rules exist on paper, the hard work of building EIA capacity in many sectors is beginning.

Over the past several years GEI has been one of the few domestic NGOs actively working to foster the creation of professional domestic NGOs as stronger advocates for environmental protection through tools such as the EIA process. In 2005, GEI began conducting public participation capacity-building workshops for journalists and other NGOs. Working with Green Earth Volunteers, GEI invited experts from around China and abroad to draft curriculums for trainings on how to participate in public hearings. In addition to producing a curriculum for future trainings, the workshops provided an opportunity to explore the role of NGOs in increasing the ability of residents in environmentally impacted regions to participate in public EIA hearings.

GEI also has been involved in other training exercises. Using the curriculum developed and the lessons learned from prior workshops, GEI held a seminar on EIA public hearings for journalists in Beijing in June and July of 2005. The main goals of these trainings were to increase journalists' capacity for reporting on EIA hearings and related processes, and to improve the ability of civil society and the media to work together in promoting public participation.

In addition, GEI conducted a simulation of a public hearing on the Nujiang Dam project EIA for both Chinese and international NGOs late in 2005. GEI also held additional trainings on "Capacity Building for Environmental NGO and

Media Participation in Public Hearings" in Tianjin, Nanjing, and Kunming in early 2006. These events have attracted participation from media and NGO employees as well as environmental officials.

The news media has already proven itself a potentially useful mechanism for empowering citizens and NGOs on EIA issues. For example, news journalists drew attention to ecologically destructive development in the Old Summer Palace (*Yuanmingyuan*) and a wetland reserve outside Beijing. In both cases, informed citizens, NGOs, and scientists rallied to stop the development projects.

GEI also has focused on reaching out to government officials with these trainings. For example, in November 2005 SEPA held a training session in Harbin for regional environmental bureau officials and EIA firms as part of the development of public participation laws. Representing China's NGOs at this training, GEI staff addressed the public's role and objectives in involvement with EIAs, and proposed mechanisms for ensuring the public's participation, such as allocating funding for citizen involvement. Parts of these government trainings also have involved GEI bringing EIA and public participation experts from overseas to expose Chinese officials to best practices in citizen involvement. SEPA's willingness to include an NGO in the making of the public participation laws was a direct result of these discussions and trainings.

THE ROAD AHEAD FOR PUBLIC PARTICIPATION IN EIA

Despite the significant progress made to include public participation in the EIA process, many challenges still remain. While today's law provides clear and concrete steps and requirements for public participation, many grey areas in the implementation process need clarification. For example, the law fails to formally delegate authority or clarify the jurisdiction of the public in the process of participation. Nor does it define the scope and jurisdiction for true veto or policymaking power on the part of participants. Furthermore, there are no provisions for supporting human resource and other expert assistance required for public participation in hearings and monitoring of the EIA process.

There also remains the issue of regional rights in China—if an activist in Beijing wants to stop the Nujiang dams from being built, but a local villager supports it because of the attractive government compensation, what right does each party have to

participate in the process? Who ultimately decides whether the project proceeds or not? These are still crucial unanswered questions.

SEPA's EIA Center, which is composed of over thirty highly experienced environmental scientists, is responsible for writing EIA-related regulations, licensing independent EIA agencies, and overseeing the work of regional EIA offices. These regional offices, which have a total staff of less than 300, are similar to all environmental protection bureaus in China—in that they depend on funding from local governments, which generally prioritize economic development over environmental protection. Independent EIA agencies are dependent on development contractors for their survival, which opens the door to corruption during the assessment process, as these agencies are free to demand higher prices to downplay environmental problems. Thus, the organizational structure for EIA enforcement tends to be weak, understaffed, and inadequately centralized.

Recognizing these shortcomings, SEPA has committed to improving the EIA Law and addressing these issues. At SEPA's Eighth Green Forum in September of 2005, SEPA's Vice-Minister Pan Yue mentioned the need to “raise public participation capacity” and “establish mechanisms for public participation.” Former SEPA minister Xie Zhenhua further stated, “in the future, improvements and amendments will certainly be made to the EIA law,” noting that as the EIA concept is now better understood, it will gradually play a key role in all development policy in China.

BUILDING CAPACITY FOR PUBLIC PARTICIPATION IN EIA

The strong rhetoric supporting public participation at the national policy level has given SEPA the

power to push for continued improvements to the law—the recent public participation regulations are a testimony to the commitment of national leaders. However, the challenge of building support and capacity within local governments, NGOs, and the public remains daunting.

As China's NGOs progressively mature, they will play an increasingly important role in the development of public participation in the EIA process. Already, in the case of the Nujiang Dam project, sixty-one Chinese NGOs and ninety-eight environmental public figures jointly wrote a letter of concern to the State Council, SEPA, and National Development and Reform Commission. This large group of stakeholders then opened a series of legal claims, beginning in 2005, calling for public hearings and the halting of construction and surveying of the Nujiang Basin. These legal actions are still in progress, but have already led to the opening of the Nujiang EIA report to the public, and to more stringent monitoring of the basin by the Yunnan Environmental Protection Administration.

The future of Nujiang, as with communities and ecosystems under development throughout China, rests largely on the continued efforts of China's environmental NGOs and their ability to fully utilize existing public participation policy. The road to effective EIAs has been long and remains uncertain, but from GEI's experience, it is clear that those challenges would be far greater without the ongoing work of China's emerging NGOs.

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COMMENTARY

The Role of Public Participation in Ecological Impact Assessment (EcIA) and Environmental Impact Assessment (EIA) in China

By Marilyn Beach, Bill Bleish, and Shelly Yang

Public participation (*gongzhong canyu*) is the new buzzword in China's environmental circles these days. Frequent industrial accidents threatening human health and natural ecology have led to more and more social conflicts and environmental disasters, often at great financial cost to the government. While the Chinese government in theory recognizes that enhanced public participation is essential for bringing about national environment and natural resource protection targets, significant political and technical challenges exist in actually bringing local citizens' voices to decisions about land and natural resources. Indeed, Chinese officials, researchers, nongovernmental organizations (NGOs) and even citizens are struggling to work out the definition of public participation, particularly vis-à-vis environmental impact assessments (EIAs).

The current debate over public participation in the environmental sphere comes amidst rapid economic development in China, which has had a double-edged impact on protection of biodiversity and fragile ecosystems in the country. On the one hand, increasing economic well-being and environmental awareness in China have led to growing concern in the government and among the urban public of the need for the conservation of biodiversity and safeguards for the services that natural ecosystems provide. One result has been a dramatic growth in the number and quality of protected areas and greater opportunities for domestic and international NGO projects focused on biodiversity.

On the other hand, the call for development has led to direct detrimental impacts on biodiversity and ecosystem integrity from projects ranging from linear infrastructure and mining, to major hydro-projects and tourism. Many of these projects are led

by local governments, some of which have become increasingly wary of NGOs and public calls for greater attention to ecological impacts of development. Such concern is misplaced, for in the long run, projects that damage ecosystem integrity will limit economic growth.

Indeed, ecological and environmental conditions are intricately linked with social wellbeing and economic vitality. A recent *People's Daily* online report stated that 2004 alone saw over 5 million "public accidents," leading to the deaths of 210,000 people, injuring another 1.75 million, and bringing about an immediate economic loss of over \$57 billion (455 billion Yuan). The Jamestown Foundation's *China Brief* newsletter estimated that the direct annual cost of such disasters for China is "more than \$81 billion (650 billion Yuan) on average, equal to six percent of the country's annual GDP." The implications are obvious, "most of China's economic growth each year is simply cancelled out by the immediate sacrifice of human lives and long-term damage to the environment."¹

RELATIONSHIP BETWEEN EIA AND ECIA

In late 2005, Fauna & Flora International's China Representative Office conducted a needs assessment for capacity building in the area of ecological impact assessment (EcIA) in western China. EcIAs in this region are particularly important because of the critical services the fragile ecosystems provide to both local and distant human populations. Box 1 identifies key ecological systems in western China that are particularly vulnerable.

EcIAs, which are rooted firmly in ecological sciences, are practiced in China as a part of EIAs.

BOX 1.

Threats to Vulnerable Ecological Systems in Western China

In western China, development projects threaten several key ecosystems. Major ecological challenges in Qinghai include vegetation degradation from construction, desertification, glacier reduction, grasslands mismanagement and pasture degeneration, poaching, and over-collection for the medicinal industry. In Xinjiang, significant threats to the environment and ecology include desertification, secondary salinization of soil arising from irrigation, pollution, and overall urbanization. Mining and other extractive industries pose significant ecological threats to soil, land and air conditions in both Qinghai and Xinjiang. Soil erosion is of special concern in the limestone karst regions in Guizhou, with degradation affecting 41.5 percent of land province-wide. Mining and smelting are also among the dominant industries threatening the ecosystem in Guizhou today.

However, our study confirmed that EIAs in China currently do not sufficiently incorporate ecological issues, generally do a poor job of considering likely ecological damage as a result of a given infrastructure or industrial project, and provide few useful alternatives for how to avoid or mitigate such impacts. While too few EIA practitioners specialize in ecological sciences, our survey did show a strong desire for more information about EcIA methods and guidelines.

REGULATORY CONTEXT FOR EIA AND ECIA

EIA and EcIA processes in China are best understood within the broader political context. In order to address past problems of environmental damage associated with poorly planned development and industrial projects, the Chinese government is now refining and restructuring the EIA process. The most recent EIA Law was enacted in 2002 and came into force on 1 September 2003.² In 2004,

SEPA established a special division in charge of EIA affairs, the Appraisal Center for Environment and Engineering (ACEE).³

When projects are expected to strongly impact social and environmental conditions in neighboring communities, the developer is required by law to hold a public hearing or seek comments and suggestions from experts and the public before submitting EIAs for approval.⁴ When light or very small environmental impacts are expected, the law requires completion of an Environmental Impact Form but no public hearing.

The new EIA law states clearly that, “the state encourages relevant organizations, experts and the public to participate in the EIA process in proper ways.” Indeed, China has signed the Rio Declaration on Environment and Development, which includes Principle 10, articulating that public access to information, participation in decision-making, and access to justice are key principles of environmental governance. SEPA’s February 2006 publication, *Provisional Measures for Public Participation in Environmental Impact Assessment*, gives slightly more detail than the EIA Law, stating that, “NGOs and volunteers are an important force in public participation,” and stipulating that the public may participate by answering an EIA questionnaire, consulting with experts, or participating in a symposium or public hearing. It also requires project contractors to provide the public with details of how construction could influence the environment and what preventive measures they have taken. The State Council *Information Office White Paper for Environmental Protection in China (1996–2005)*, published on 5 June 2006, refers to appraisal meetings or hearings for construction projects that may cause unfavorable harm to the environment to collect opinions of the public, relevant government authorities, and experts in the field.

Translating these legal requirements for citizen input, however, has been challenging, particularly in the area of ecological assessments. Active public participation in decision-making about development priorities is virtually non-existent, and most of the meetings and hearings take place after decisions and investments have already been made.

ECIA TRAINING NEEDS ASSESSMENT IN WESTERN CHINA

In 2005, FFI administered written questionnaires and conducted interviews and field visits with environmental assessment practitioners (both

private and government) in Qinghai, Xinjiang, and Guizhou. The FFI surveys revealed several key gaps in the field of assessment:

- Lack of baseline information about ecological subjects;
- Inadequate skill sets among environmental assessment practitioners related to impact prediction, mitigation and restoration, and monitoring. Moreover, post-impact monitoring is not strongly emphasized in training programs;
- Little value of the importance of public participation in assessments and methods to involve communities; and,
- Insufficient sharing of best practice models and international experiences among assessment practitioners.

In sum, awareness of biodiversity and its value is still quite low, even among EIA practitioners. In addition to evaluating the limited capacity of assessors, through the survey, FFI was able to assess the level of public involvement, or the lack thereof, in the environmental review process in general and especially when focused on ecological impact.

Without exception, all three regional environmental protection bureaus (EPBs) and EIA practitioners respondents requested additional training opportunities that address new EIA guidelines, strengthen certain skill sets, provide new methods and techniques, and offer case studies from relevant projects both in China and internationally. Our survey also revealed crucial baseline data that the practitioners designated as most crucial and often lacked, such as studies on: (1) construction projects, especially roads, dams, and mines; (2) indirect and direct impacts on habitats and biodiversity in project areas as well as in downstream regions; (3) wildlife mortality and fecundity; (4) water tables and other hydrological changes, especially affecting herding and agriculture; (5) water quantity and quality; and (5) soil pollution. The skill sets these practitioners identified as priorities included:

- Impact prediction and analysis (impacts of erosion, tourism, nature reserves and scenic areas on biodiversity and ecosystem integrity);
- Impact mitigation;
- Restoration methods and models (drought, extremes of cold weather, reservoirs, dry and arid regions and other fragile ecosystems); and,
- Long-term post-project impact monitoring.

The EIA practitioners who were interviewed were all hard-working, well-educated members of their communities. Our study revealed a genuine, albeit nascent, interest in learning more about how to predict environmental impacts and to work better with communities. These desires to strengthen the assessment process need to be backed up by a system that produces an EIA capable of influencing decision-making at local government offices and local industries. We also found a number of key broader issues for EcIA that still need to be addressed:

- How do local development plans measure up to national and regional biodiversity goals and plans?
- How can stakeholders work together to find opportunities to maintain species populations and ecosystem integrity?
- Is there risk of species extinction due to economic and urban development, and, if so, how can it be prevented from happening? What will be the consequences of extinction?
- Might alien species invade the local ecosystem as a result of the proposed project? What are the social and economic consequences of this?
- In what ways are the ecosystem process and services threatened? If they are damaged, how will local communities be affected?
- If habitats are lost or altered, is an alternative habitat available to support associated species populations? How can the project proponents and the community ensure that the habitat is made available?

ROLE OF PUBLIC PARTICIPATION

Impact assessments in China rarely recognize the dynamic relationship between development projects and local community members. Many EIAs include information about local economic development, but often do not explore how a given project will impact the community. Although human beings are a critical part of the ecosystem and a critical parameter in ecosystem management/protection, they are not widely recognized as key stakeholders in the EIA process, perhaps because the local community members currently have little influence over land use decisions. In the words of one respondent, “government officials are decision-makers. EIA workers examine and execute laws and regulations, and communities are passive and must obey.”

Our study found a striking resistance within the private assessment companies, developers, and even among local EPBs on the role of communities and public participation in all phases of project planning, development, assessment, mitigation, and implementation. Because the public is not seen as an important stakeholder, EIA practitioners often stated that communities do not need to be consulted and their views are not considered useful. What is more, those conducting EIAs and those completing the survey questionnaires are hired or chosen by the factory or company sponsoring the assessment. Responses therefore cannot be objective and likely do not represent views of the broader community. In the words of one interviewee, “perhaps as a result, over 99 percent of the community members interviewed generally show agreement with the project.”

Moreover, some practitioners in Xinjiang claimed that, while the goal of community involvement should be to limit negative impacts on the community and help the company refine their development plans, community consultation is actually done to satisfy legal requirements in the approval process. The environmental assessment practitioners do not aim to understand how companies and project managers can interact better with communities, get increased support for their activities, or develop a more sustainable project.

On a brighter note, there was some evidence that public participation is gaining more credence as a useful tool for assessments among practitioners, no doubt because conflicts over land and resource use often involve community members. In the words of one respondent, “in new EIA projects, it will be important to pay attention to the public’s participation, as well as pay attention to how water, land and air is affected. The public can help us understand how pollution is damaging our environment in construction zones and how we can protect ecological systems.”

While more discussion of public involvement is necessary, neither the agencies responsible for conducting EIAs nor the NGOs working on related issues fully understand how to work together to ensure that ecosystem services and biodiversity are protected. Some key measures the local governments and assessment practitioners can take to strengthen public participation in the overall EIA process include:

- Enhance understanding of the role of communities as key stakeholders, and their potential role in monitoring and protecting ecological health;

- Inform citizens of legislation and legal rights, especially of recent laws providing public access to information and participation;
- Strengthen awareness among local officials and industry managers of the business case for working cooperatively with communities;
- Organize public hearings and other channels for public participation; and,
- Work with, develop, and protect rights of NGOs working on environmental justice issues.

KEY MESSAGES FROM FFI'S ECIA STUDY

Incorporate consideration of biodiversity and ecosystem services into the EIA process. Until recently, environmental protection in China largely focused on the impacts of industrial pollution on water and air quality. EIA practitioners, government planners and supervisors, project proponents, and affected communities would all benefit from increased understanding of the role of biodiversity and natural ecosystems in providing the services on which communities depend. EIA practitioners also need specialist skills and mastery of concepts for EcIA, to enable them to predict impacts of project activities on ecosystems and species populations, and to propose measures to avoid, mitigate, and restore.

Protect against bias and influence in EIA. In order to strengthen the role of EIA/EcIA and to ensure scientific quality, all studies should be peer reviewed by fully independent panels that are made up of appropriate experts and financed separately for the sole purpose of review. Expert peer review allows for better development of standards for the study, clarification of the terms of reference, and an opportunity to ensure that ecological issues are included in the practitioner’s approach to the assessment. These panels must come with enabling legislation that provides full funding, authorized by law, so that enforcement officers are not subject to political influence. SEPA’s EIA expert database could potentially be used to identify appropriate independent review panel members.⁵

A good review process is especially valuable for government officials involved in decision-making. Besides verifying the scientific quality of the EIA/EcIA, expert peer review can also help protect against environmental disasters that are financially and politically costly to local and provincial governments.

Ensure full public access to EIA reports and NGO involvement. Another approach to improve EIAs and EcIAs would be to allow the public full access to EIA reports and give NGOs and the public enough time to review and comment on the reports so as to allow them time to mount their own independent assessment. Publishing EIA reports on government websites would be a cost-effective method to help achieve this goal. There are some good examples indicating that the public has awareness and is able to participate in some areas such as the Yuanmingyuan Park public hearing, the Beijing high-pressure cube construction, illegal logging by the Asia Pulp and Paper (APP) Company in Yunnan, and disputes over the construction of a dam on the Nujiang. Most of these cases notably involved public comments in large urban areas, which highlights the need for expert facilitation in remote rural areas that often lack the access to information and capacity necessary to participate effectively in an EIA review.

This indicates a need for better-trained, well-positioned environmental NGOs to help act as expert facilitators. Environmental science and urban planning departments could also be set up or strengthened to help such communities and local governments conduct some of the needed baseline studies and other background research. Such an initiative would help communities and simultaneously train and expose students to field methods and environmental protection.

Institutional context and factors influencing EIA. Effective impact assessments require independent research, from the funding and scoping stages to data collection, report writing, and the review of results. The assessment process must operate with transparency and accountability, and the research institutes must be governed in such a way that quality of ecological and environmental impact assessment results are held to the highest standards. Public participation can be incorporated into the process so that social forces are leveraged, and industries and construction projects can avoid and mitigate problems. In addition, awareness is needed not only among the public, but also among local leaders and industry professionals, who must understand the value of engaging community members in their project.

CONCLUSION

In summary, the capacity to conduct EcIAs needs to be strengthened, especially in the more remote

regions of China. Additionally, a more conducive policy environment is necessary to give EIA reports more influence in determining which projects are approved, disapproved, or cited for violation. As in all countries throughout the world, local government and industries in China need to work more cooperatively to preserve the ecological integrity of the land and water. Just as important, technical and scientific management of the environment must include public participation as one of its key features.

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NOTES

1. Wenran Jiang, (2005, December 6). "The costs of China's modernization," *China Brief*. Washington, DC, The Jamestown Foundation.

2. U.S. and Foreign Commercial Service. (2003, 7 September). "China adopts environmental impact assessment law." Neal A. Stender, Dong Wang, & Jing Zhou. (2003, 15 March). "China's new environmental impact assessment law." Coudert Brothers LLP.

3. ACEE conducts technical work for EIAs for State supported/approved large- and medium-sized development and construction projects. It also provides environmental consulting and services to enterprises and institutions for both domestic and international projects by carrying out relevant scientific and technical research and development. ACEE conducts training programs designed to build capacity within the EIA field in China, and is increasingly involved in public participation in the EIA and project procurement process.

4. It should be noted, however, that in practice when a project is considered sensitive or confidential, this law has not been applied and public consultation does not occur.

5. "Management Regulations for EIA Supervision Experts Bank" specifies that the experts who attend the evaluation of an EIA report should be chosen at random from an approved bank of experts, based on their expertise and profession. If the expert has an interest with the EIA servicing institution that might impact objectivity of her/his evaluation, then she/he should voluntarily excuse herself/himself.

Coal Burning and Children's Health in China

By Frederica Perera, Deliang Tang, Barbara A. Finamore, and Li Ting-Yu

Air pollution from coal burning in China adversely affects the health of people living in China and—as we discuss later—worldwide. Moreover, coal burning power plants in China and many other countries are a major source of carbon dioxide (CO₂), the most significant global warming gas. Since 2002, the Columbia Center for Children's Environmental Health (CCCEH) has been leading an interdisciplinary research project in Tongliang county within Chongqing municipality, investigating health benefits to children from the elimination of a coal burning power plant in the county. The research is unique in combining state-of-the-art molecular epidemiologic techniques with air monitoring data, geographic information system analysis, and clinical pediatric assessments. It is anticipated that the study will provide policy-relevant data on the health, environmental, and economic benefits of adopting alternatives to uncontrolled coal burning for energy production.

As the most populated country in the world, with 1.3 billion people, China has struggled to provide sufficient energy to fuel continued economic growth. Like many rapidly developing countries, China has relied heavily on coal for low-cost energy production, with the result that coal combustion accounts for 70 percent of total energy production. Coal-fired power plants in China currently produce nearly 75 percent of the country's electricity. The majority of new power plants are being built to burn coal; China burned approximately 1.9 billion tons of coal in 2005—a 12 percent increase from 2004. If such production practices continue, China alone could negate the progress of other countries that are cutting back on dirty coal emissions, phasing in cleaner fuel alternatives, and limiting greenhouse gas emissions.

Coal combustion emissions are of particular concern for children's health because they contain



Tongliang power plant before closure. © Authors

polycyclic aromatic hydrocarbons (PAHs), particulate matter (PM), sulfur dioxide (SO₂), and metals such as mercury. Adverse birth outcomes, developmental problems, asthma, and various cancers have all been linked to these air pollutants. Fetuses and young children are likely to be especially vulnerable to these pollutants due to their rapid development and immature cellular defenses. Because of long-range transport of air pollutants, emissions from coal burning in one country can adversely affect children's health worldwide. An estimated 40 percent of mercury in the United States, for example, comes from power plant emissions overseas. Therefore, air pollution is one of the main issues of concern to the Chinese government. China has been making efforts to save energy, optimize its energy structure, and increase energy efficiency to balance consumption and environmental needs. For example, since 1999 Chongqing has supplied natural gas instead

of coal to families and hospitals throughout the municipality. The local government also asked power plants to move to rural areas or shut down to improve environmental quality.

THE CCCEH PROJECT

The overall goal of the CCCEH project is prevention of developmental disorders, asthma, and cancer in children. Working with Chinese colleagues, CCCEH scientists are documenting exposure, biomarkers, and health outcomes in two groups of newborns—the first enrolled before the Tongliang power plant was shut down in Chongqing in 2004; the second enrolled after the closure. Both cohorts of children are being followed to compare their exposure to air pollutants and their health and development over the first years of childhood. The specific objectives are to:

- (1) Conduct repeated studies of newborns using monitoring, biomarkers, and assessment of clinical outcomes to document the health benefits of reducing PAHs and co-pollutants in ambient air; and,
- (2) Translate the results so they are useful to both the scientific community and to policymakers responsible for protecting child health and developing sustainable energy policy.

With a population of more than 32,000,000, the municipality of Chongqing is one of the largest and heavily polluted cities in China, largely due to coal combustion by industry and power plants. The county of Tongliang in Chongqing has a population of over 800,000. Tongliang is situated in a small basin approximately 3 kilometers in diameter. Prior to 2004, a coal-fired power plant located south of Tongliang's center operated 6 months each year (from December 1st to May 31st) to compensate for insufficient hydroelectric power during those months. The plant was the principal source of local air pollution; in 1995 nearly all domestic heating and cooking units had been converted to natural gas and motor vehicles were not yet a major source of air pollution. The plant was not equipped with modern pollution reduction technology and burned about 25,000 tons of high sulfur coal during each 6-month period of operation.

Since 2002, a diverse group of U.S. and Chinese investigators have been gathering and analyzing pollution emission and children's health data in Tongliang. CCCEH collaborators include

Chongqing University of Medical Sciences, University of Nevada Desert Research Institute, Natural Resources Defense Council (NRDC), Chongqing Institute of Environmental Science, Chongqing Center of Environmental Monitoring, Harvard University, and Chongqing Municipal Economic Commission.

Air monitoring collected as part of the CCCEH project showed ambient concentrations of the representative PAH, benzo[a]pyrene (C₂₀H₁₂), in Tongliang county were up to three and a half times higher during the power plant's operational period. The average ambient PM_{2.5} levels were five times higher than the annual PM_{2.5} U.S. National Ambient Air Quality Standard (NAAQS) of 15 µg/m³ (micrograms per cubic meter).¹ Marked seasonal variation in air pollution (PAHs and particulate matter/PM) was attributable in large part to power plant emissions. Newborns in the first cohort (those who were *in utero* during operation of the coal burning power plant) had higher levels of DNA damage due to prenatal exposure to PAHs than newborns in either New York City or Krakow, Poland.² CCCEH researchers observed that newborns with high levels of PAH-DNA damage had smaller head circumference at birth, as well as lower weight growth rate in childhood, although they are still within the normal range.³ Mercury, another air pollutant detected in Tongliang, is known to be toxic to the developing brain, with adverse effects on children's intelligence and the ability to learn. In addition, the Tongliang study has found evidence that children with the higher estimated exposure to PAHs performed less well on developmental tests at age two. Finally, the study is examining the relationship between coal burning emissions and respiratory problems.

In May 2004, the power plant was permanently shut down after the Tongliang county government determined that its closure would have minimal adverse social and economic consequences. The second cohort of children was enrolled between March and June 2005 and similar data are being collected on these children to estimate the health benefits of eliminating the polluting source. Another cohort will be collected in 2006.

REWARDING PARTNERSHIP

The research partnership between U.S. and Chinese investigators has been mutually rewarding in many ways. New Chinese investigators have been trained in molecular epidemiology and monitoring, while

the U.S. investigators have learned new lessons in mounting field studies rapidly and efficiently. For example, to support the study in Tongliang, a fully equipped laboratory was established almost overnight at Tongliang County Hospital to process and store all biological samples collected at delivery from the mothers and newborns. The laboratory operated around the clock in order to maintain the quality of specimens. When a centrifuge broke, a replacement centrifuge was immediately found in the Children's Hospital of Chongqing University of Medical Sciences and quickly driven to Tongliang—one hour and a half away; no samples were lost. Throughout the enrollment period, blood samples were picked up immediately after delivery at the four participating hospitals by the laboratory coordinator—on a bicycle. The same bicycle was also used to collect the global position system data on the location of study participants' residences—a practical merging of low and high technology.

POTENTIAL IMPACTS

It is anticipated that the CCCEH China project will continue to contribute vital scientific information to the debate on energy policy in China, both at the local level and nationwide. Fortunately, Chongqing municipality is considering a plan to shut down more of its highly polluting coal-fired plants and expand the use of natural gas and energy efficiency measures. Preliminary NRDC work in Jiangsu Province has shown that energy efficiency incentive programs administered by the local government through the utility company could eliminate the need for two large power plants every 3 to 4 years. Multiplied nationwide, children's health and general air quality benefits would be substantial. With its partners, the CCCEH China project plans to quantify the health benefits from lowered coal burning emissions and apply that quantification to key utility energy efficiency demonstration areas, such as Jiangsu Province, Chongqing municipality, and other regions.

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NOTES

1. Chow JC; Watson JG; Chen LW; Ho SS; Koracin D; Zielinska B; Tang D; Perera F; & Cao J, Lee SC. (2006). "Exposure to PM2.5 and PAHs from the Tong Liang, China epidemiological study." *Journal of Environmental and Science Health*, 41(4), 517-42.
2. Perera F; Tang D; Whyatt R; Lederman SA; & Jedrychowski W. (2005). "DNA damage from polycyclic aromatic hydrocarbons measured by benzo[a]pyrene-DNA adducts in mothers and newborns from Northern Manhattan, the World Trade Center Area, Poland, and China." *Cancer Epidemiol Biomarkers and Prevention*, March, 14(3),709-14.
3. Tang D, Li TY, Liu JJ, Chen YH, Qu L, Perera F. (2006). "PAH-DNA adducts in cord blood and fetal and child development in a Chinese cohort." *Environmental Health Perspectives*, August 114(8), 1297-1300.

Opening up the Floor: Environmental Performance Information Disclosure Pilot Programs in Zhenjiang and Hohhot

By Wanxin Li

The Chinese government has been promulgating ever-stricter pollution control laws over the past 25 years—experimenting with harsher penalties for pollution violations, incentives for industries, market-based tools, and most recently a stronger environmental impact assessment (EIA) law. One notable gap hindering the effectiveness of all of these more innovative pollution control policies has been the lack of transparency and formal involvement of the public. In 2006, China's State Environmental Protection Administration (SEPA) introduced—with much fanfare—groundbreaking regulations requiring public hearings for EIAs, as well as another much less publicized national program on environmental performance information disclosure (EPID).

The EPID program stems from a major pilot project supported by the World Bank's InfoDev Program, which since 1998 has enabled SEPA, China Research Academy of Environmental Sciences (CRAES), and Nanjing University to carry out two municipal-level pilot programs. Adapted from Indonesia's PROPER, EPID in China rates the environmental performance of industries from best to worst in five colors—green, blue, yellow, red, and black. The ratings of each industry are then disseminated to the public through the news media. Two municipalities, Zhenjiang (Jiangsu Province) and Hohhot (Inner Mongolia) were chosen to pilot this program between 1999 and 2000.

The EPID pilot program was extensively implemented in Zhenjiang. A well-publicized press conference was held in July 2000 to announce the color rating results of the 91 participating industrial enterprises. The Zhenjiang environmental protection bureau (EPB) subsequently transformed its EPID pilot into a standardized operation and since

2000 has greatly expanded its size and scope. The number of enterprises participating in the EPID program in Zhenjiang increased from 91 in 2000 to 800 in 2005. In 2005, besides manufacturing industries (e.g., iron, steel, paper, and pulp), the environmental performance of about 80 tertiary industries (e.g., restaurants and hotels) was color rated and disclosed in Zhenjiang. In 2002, EPID was expanded province-wide in Jiangsu.

In contrast to Zhenjiang, the Hohhot government never enthusiastically embraced the EPID pilot. In fact, the color ratings of 107 enterprises in 1999 in Hohhot were never presented through a press conference and the city's EPID program was stopped after the first year's pilot.

Between November 2004 and August 2005, I spent ten months conducting fieldwork for my dissertation, seeking to make sense of the contrasting results of these two pilot programs. I carried out countless open-ended interviews and structured questionnaires to examine the implementation processes and program impacts in the two cities. SEPA is attempting to make EPID a national program, which underscores the importance of investigating past experience and finding out what drove the success and shortcomings in these two very divergent pilot programs. My investigation focused on two crucial questions: (1) how the two EPBs perceived their tasks in implementing the EPID program; and (2) what resources (e.g., financial, technical, political, and informational) were available to the EPBs to carry out the program.

PERCEPTION OF THE TASK

Two Chinese research institutions—Nanjing University and the Hohhot Research Academy

of Environmental Sciences (HRAES) signed a contract with the World Bank to execute EPID. Nanjing University positioned itself to provide technical assistance and gave the responsibility of implementing EPID to the Zhenjiang EPB. The bureau leadership embraced EPID immediately. Of central importance was the EPB Director Chu who believed EPID would be instrumental for his EPB to better manage industrial enterprises and to utilize the public pressure to help keep industry clean. In Hohhot, HRAES did not formally partner with the Hohhot EPB to implement EPID. Therefore, the Hohhot EPB leaders viewed EPID as a research project and not a management tool with which to advance their pollution control capacity. In general, the Hohhot EPB viewed the EPID pilot program as an extra and unimportant task.

RESOURCES AT DISPOSAL OF THE IMPLEMENTERS

Accessibility of Environmental Information

To implement EPID, access to industry-level pollution information—such as pollutant discharge, administrative penalties, fines, and citizen complaints—is key. Within EPBs, the records of violations, penalties, and citizen complaints are kept in the offices of compliance and enforcement, pollution control, and planning. Monitoring stations run by local EPBs are responsible for collecting information on both ambient environmental quality and pollution. In China, a station monitoring industries will generally carry out the following four types of tasks: (1) regular monitoring of general pollution sources once a year, which is assigned by the EPB planning and pollution control offices; (2) targeted monitoring of important pollution sources, usually 3 to 4 times a year as assigned by the same EPB offices as noted above; (3) monitoring specifically for environmental campaigns or investigations ordered by

the local EPB compliance and enforcement office, local People's Congress, or other upper level agencies; and (4) contracted monitoring by industry.¹

Despite EPB requirements for industries to self-report pollution information once a year, most Chinese factories lack the capacity to monitor their emissions. Thus, industries must contract with local EPB-run monitoring stations, which use charges to industries for employee salaries. As a result, monitoring stations tend to prefer contract work to mandatory assignments, which have more modest compensation. Not surprisingly, sometimes the reliability and accuracy of pollution information are compromised because business interests prevail under such contractual relationships.²

The pollution information for both EPID pilot programs was mainly acquired through regular monitoring once a year for low polluting enterprises and 3 to 4 times a year for highly polluting enterprises. However, the administrative capacity—budget size, percentage of environmental professionals, and monitoring facilities—of the Zhenjiang EPB was superior to that of Hohhot. (See Table 1). As a result, the environmental information available for EPID in Zhenjiang was much more comprehensive than that in Hohhot.

Technical Support

To develop a computerized color rating system, Nanjing University provided technical support directly to the Zhenjiang EPB. In contrast, CRAES assisted HRAES but rarely interacted with the Hohhot EPB. Nanjing University is only 80 kilometers (km) away from Zhenjiang. A then-doctoral student at Nanjing University was working fulltime on this Zhenjiang EPID pilot. Between early 1999 and July 2000, he visited the Zhenjiang EPB office 2 to 3 times a week attending meetings and discussions, and writing and testing computer programs for the rating system.

TABLE 1. Staff and Equipment of Zhenjiang and Hohhot EPBs in 1999

	Zhenjiang	Hohhot
EPB Administrative Staff	70	21
Compliance & Enforcement Office Staff	20	3
Monitoring Station Staff (percent professional)	60 (90)	81 (70)
Real time mobile monitors (in 2004)	4	0

Source: Compiled by author through interviews in 2004-2005.

In contrast, CRAES is located in Beijing, 669 km away from Hohhot. CREAS is a research organ of SEPA, where the in-house experts are always fully loaded with urgent work of national or regional importance. Because of the travel time and already extensive workload, it was difficult for CREAS experts to go to Hohhot frequently for meetings and discussions on EPID. Between February 1999 and March 2000, CREAS researchers paid less than ten visits to Hohhot. The computerized color rating system was mainly developed in Beijing and tested with pollution data provided by Hohhot EPB through HRAES.

Delegation of Authority and Trust

In Zhenjiang, Director Chu relied on a colleague who had worked with him for over 17 years—Ms. Qu, the head of the environmental management and environmental science and technology office—for EPID implementation. There were occasions when urgent decisions on EPID needed to be made when Director Chu was not available. When these moments arose, Qu was always available to take over; for example, Qu drafted a memo and submitted it to the legal office of the Zhenjiang city government when Director Chu was overseas. Upon Director Chu's return, he praised Qu for taking the initiative. Such delegation of authority is relatively rare within China's risk-averse bureaucracies where asking for advice from and reporting to higher-level officials before one acts is the norm. So the trusting relationship Director Chu and Ms. Qu developed over the years made Qu the *de facto* decision-maker on EPID. Under this attentive manager the Zhenjiang EPID program's implementation was very smooth and productive.

In contrast, the EPID pilot in Hohhot was contracted to HRAES and the director of HRAES struggled to get sufficient power to implement the pilot program. Since HRAES is lower than the Hohhot EPB in the government hierarchy, HRAES researchers had to work through the Hohhot EPB in dealing with relevant municipal agencies and industries in Hohhot. In short, while HRAES was assigned the responsibility to carry out the EPID pilot it was not given the authority. Throughout the pilot program, the administrative authority remained with Hohhot EPB, which greatly hindered the ability of HRAES to implement EPID.

Financial Resources

In Zhenjiang, implementing EPID did not require additional financial resources since local EPB staff

members carried out the work. Making the color rating results headlines of local newspapers cost the Zhenjiang EPB about 100,000 Yuan in 2005. The Zhenjiang EPB paid 24,000 Yuan to cover EPID training expenses with the Jiangsu provincial EPB in 2003. The funds from the World Bank's InfoDev Program helped cover much of the research costs in both cities. In short, for both the Zhenjiang and Hohhot EPBs, funding was not an obstacle in implementing EPID programs.

CONTEXT OF THE EPID PILOT PROGRAMS

China has a long reputation of government secrecy. Thus, disclosing the environmental performance of industrial enterprises—many of which are government owned—inevitably brings local industries and governments under unaccustomed public scrutiny and potentially could reveal corrupt conduct. Economic development has been the top priority in China for the past 25 year, which has meant environmental goals are frequently compromised by local government agencies that even help their enterprises circumvent pollution control regulations (Economy, 1997; Chen, & Uitto, 2002).

To help prevent the potential logjam over revealing industry information, Director Chu of the Zhenjiang EPB actively reached out to the city government and relevant agencies to articulate the improvements EPID could bring to the environmental protection work in Zhenjiang. By making the environmental performance of industrial enterprises visible, the public would be empowered to target bad polluters and help the EPB take enforcement actions.

Environmental goals are frequently compromised by local government agencies that even help their enterprises circumvent pollution control regulations.

The Zhenjiang city government was receptive to Director Chu's proposal to strengthen environmental enforcement, for in 1999 SEPA carried out the "Midnight Action" environmental campaign,

aimed at bringing industrial enterprises located along the Yangtze River into compliance with pollution emission standards by conducting surprise inspections at night. This campaign put great pressure on the Zhenjiang city government, because if SEPA had discovered the large number of industrial enterprises out of compliance, the Zhenjiang EPB and city government would have been put to shame. Thus, the city government was open and supportive of the EPID pilot.

In contrast, the Hohhot EPID pilot implementation team never actively reached out to the city government. In January 2000, when the color rating results were ready to be made public, the Hohhot city government was at odds on how to proceed, as an enterprise that contributed over one-third of the local tax revenue had received a rating of “black.” Consequently, the city government refused to disclose the EPID pilot rating results. It was not until March 2000 that an internal meeting was held in a government office building, in which only select news reporters and representatives of enterprises who participated in EPID program were invited to discuss the rating results.

IMPACT ON THE ENVIRONMENTAL BEHAVIOR OF INDUSTRY AND THE PUBLIC

The EPID programs in China are voluntary for municipal governments but once a municipality adopts the program, participation by local industries is mandatory. This requirement preempts industry negotiation on conditions for participating in an EPID program.

The Zhenjiang EPB officials are exploring ways to strengthen the EPID program to improve monitoring and enforcement work. For example, they are planning to target “yellow” enterprises that are in partial compliance and require them to adopt cleaner production methods that could potentially bring them into full compliance. Ironically, the Zhenjiang EPB faces a challenge in keeping the highest rated industries interested in the program, for such industries were not satisfied with simply having positive publicity in local newspapers. For example, “green” and “blue” enterprises in Zhenjiang requested more substantial benefits for their good performance, such as favorable treatment by the Zhenjiang EPB in loan applications for environmental protection work or rights to label their product as green. These

These cleaner industries were frustrated because they did not see how their time and commitment to the EPID program helped their bottom line.

cleaner industries were frustrated because they did not see how their time and commitment to the EPID program helped their bottom line.³ The dissatisfaction of these industries highlights an important follow-up issue that EPBs should address in later implementation of the EPID program.

Another notable gap in Zhenjiang’s program is the lack of public engagement. The two EPID pilots published color-rating results in local newspapers or on the Internet. But neither undertook active public education programs to teach citizens how to understand and use the rating information. Thus, without the government involving the public in the EPID pilot, a key piece of the information dissemination program was missing.

Between June and July of 2000, poor public engagement was made increasingly apparent when the Zhenjiang EPB distributed pamphlets entitled *Background, Definition, Purpose, and Outlook of EPID* to city government agencies and the mass media, but not to the general public. Since the pilot project failed to engage the public, it is not surprising that a 2000 poll conducted in Zhenjiang by Nanjing University on the information disclosure program showed that although 56 percent of the 845 survey respondents were aware of the EPID pilot program, only 8.3 percent understood its objectives (Wang, Cao, Wang, & Lu, 2002). The Hohhot EPID pilot also did not carry out any public education program on EPID.

Despite the lack of public empowerment, some industries did feel public pressure. For example in Zhenjiang, the CEO of a construction materials manufacturing company which was rated “black” in 2002 decided to invest in wastewater treatment because he could not stand comments his friends made at dinner parties, enquiring into why his company was rated “black.” By 2003 this company had raised its rating to “blue.”⁴

IMPLICATIONS OF EPID PILOT PROGRAMS FOR REGULATORY ENFORCEMENT IN CHINA

An informational approach to environmental regulations like EPID allows firms to choose whether or not, and how, to comply with environmental regulations. For EPID to have an effect on environmental regulatory enforcement, the government needs to have the capacity to collect accurate and reliable information and disseminate the results to both industry and the public. The public has to come to understand that they are not only passive information receivers, but that EPID empowers them to take action. In this manner, poor industry performers will know they might become the target of pressure from government and the public.

However, for disclosure programs to bridge the information and enforcement gap in China's environmental governance system, there is an urgent need to establish multi-stakeholder dialogues on environmental information disclosure between the government, industry, and the public. In regions where the level of public environmental awareness is low, such dialogues will be crucial in helping the public understand pollution information and transform society into environmental enforcers. While the Zhenjiang pilot program was more successful in engaging the government and industry participants than the Hohhot pilot program, both failed to establish stakeholder dialogues on EPID or to engage public participation in environmental enforcement in a meaningful manner.

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REFERENCES

Chen, Sulan; & Uitto, Juha I. (2002). "Governing marine and coastal environment in China: Building local government capacity through international cooperation." *China Environment Series*, (6), 67-80.

Economy, Elizabeth. (1997). *Environmental scarcities, state capacity, civil violence: The case of China*. Washington, D.C.: American Academy of Arts and Sciences.

Wang, Hua; Cao, Dong; Wang, Jinnan; & Lu, Genfa. (2002). *Environmental information disclosure: Theory and practice*. Beijing: Chinese Environmental Science Publisher.

NOTES

1. Interview 07182005-01. The names of these four types of monitoring of pollution in Chinese are: (1) *changgui jiance*; (2) *zhongdian wuranyuan jiance*; (3) *zhuanxiang jiance*; (4) *weituo jiance*.

2. Interview 07182005-01.

3. Interviews 06062005-02; 06062005-03; 06062005-04; 06072005-01; 06072005-02; 06082005-01.

4. Interview 06082005-03.

The Difference a Legislature Makes: Administering Market-Driven Air Pollution Control Regulations in Taiwan and China

By Eric Zusman

In 2002, I attended a meeting that was organized by the Asian Development Bank, Resources for the Future, and local Chinese partners to evaluate the progress of a stalled pilot emissions trading program in Taiyuan, China. At the meeting, I watched attentively as participants argued over the seemingly mundane details of how permits would be allocated and enforced (Research Notes, 2001). Almost four years later, I interviewed officials about the progress of a fully implemented emissions trading program in Taipei, Taiwan. Like their Taiyuan counterparts, Taiwanese officials encountered numerous disputes over administrative issues that hindered the implementation of the trading program, which had been in consideration since the late 1980s (Interview File 1, 2005).¹ Though Taiwanese and Chinese regulatory experiences in adopting a market-driven mechanism differ, they have more in common than meets the eye.

Both Taiwan and China have found that the most challenging aspect of implementing market-driven regulations (i.e., tradable permits and emissions fees) is perhaps the most mundane: designing a set of administrative rules supporting the enforcement of these innovative pollution control measures. This difficulty stems from another similarity; namely, both rely upon local environmental protection bureaus (EPBs) (*difang huanbaoju*) to enforce regulations, necessitating that they overcome regional government intransigence to implement directives adopted at the central level.² The weakness of the EPBs underscores the importance of clear administrative rules specifying how regulations should be enforced.

To highlight a key distinction between Taiwan and China on this issue, after I finished my interview

in Taipei, I went for a run; after I finished the meeting in Taiyuan, I went to sleep because I did not want to endanger my lungs in the city's coal-filled air. Taiwan's market-driven air pollution control regulations have greatly improved air quality in Taipei, while Taiyuan still has smoggy air that threatens the lungs of runners and walkers alike. This air quality contrast stems in great part from the difference in administrative rules supporting the enforcement of the market-driven regulations. Ultimately, the more accountable political institutions make legislators for the administration of air pollution regulations, the more likely they are to clearly explicate the enforcement responsibilities of environmental agencies, thereby facilitating the evaluation and pressure on EPB bureaucrats charged with administering market-driven regulations. This is the difference a legislature can make. In this commentary, I examine this difference by looking at the impact of Taiwan's Legislative Yuan on the design of one type of market-driven regulation, emissions fees. Insights from this case offer lessons for other types of market-driven pollution regulations on both sides of the Taiwan Strait.

TAIWAN'S AIR POLLUTION FEES: THE CASE OF ARTICLE 10

During the late 1980s, policy advisors to Taiwan's leadership concluded that to manage the island's pollution problems more was needed than the command-control standards, subsidies and tax breaks granted to polluting industries for end-of-the-pipe abatement technologies that had constituted the core elements of Taiwan's regulatory regime up to that point (Shaw & Hung, 2001). This conviction coincided with mounting popular discontent over

the pro-business leanings of the ruling Nationalist (*Kuomintang*, KMT) government and the subsequent establishment of Taiwan's Environmental Protection Agency (TEPA) (Yeh, 1993; Reardon-Anderson, 1992).³ It also resulted in the strengthening and passage of a number of new regulations, most notably the insertion of provisions for pollution fees into Taiwan's third revision of the 1992 Air Pollution Control Act (APCA) (Tang, 1994).⁴ To avoid encountering objections from industry and give TEPA enough discretion over the pollution fee, the now infamous Article 10 of the 1992 APCA was left deliberately vague (Interview File 3, 2005). Article 10 in the 1992 APCL states:

[Environmental] agencies at each level should, according to the type and the amount of a pollutant, assess a pollution prevention fee. The variations and the method for collecting the fee from the pollution sources are to be determined by the primary (environmental) agency at the central level [e.g., TEPA] in consultation with other relevant agencies.

When TEPA interpreted this language, it decided to transform the fee into an easy-to-collect surcharge on gasoline under the pretense that it would reduce automobile use and emissions from mobile sources. The logic underpinning such an interpretation, as environmental organizations, consumer groups, and the then rival DPP noticed, was fundamentally flawed. The demand for gasoline—to give one example of a charge these opposition groups leveled—was relatively inelastic and thus did not cut into automobile use or reduce emissions. More seriously, the fuel surcharge missed large stationary polluters that were still the biggest contributors to Taiwan's air pollution problems at the time (Tang & Tang, 2000).

Soon after the release of the implementing rules, representatives from the Legislative Yuan made it a point to highlight these shortcomings. Representative Zhao Yuanqing remarked to the news media that, “the polluter pays principle has morphed into the gasoline user pays principle, the name of environmental regulation is being used to [disguise] a tax to raise funds for TEPA.” Shortly thereafter Zhao and several of his colleagues called for a special report from TEPA explaining the fee's

use and intended effects. Remarks and requests like these initiated a prolonged debate within the Legislative Yuan on the interpretation of Article 10 and eventually resulted in an appeal from 67 legislators to the higher courts for further clarification (He, 1996; Zhang, 1996; Interview File 4, 2005).

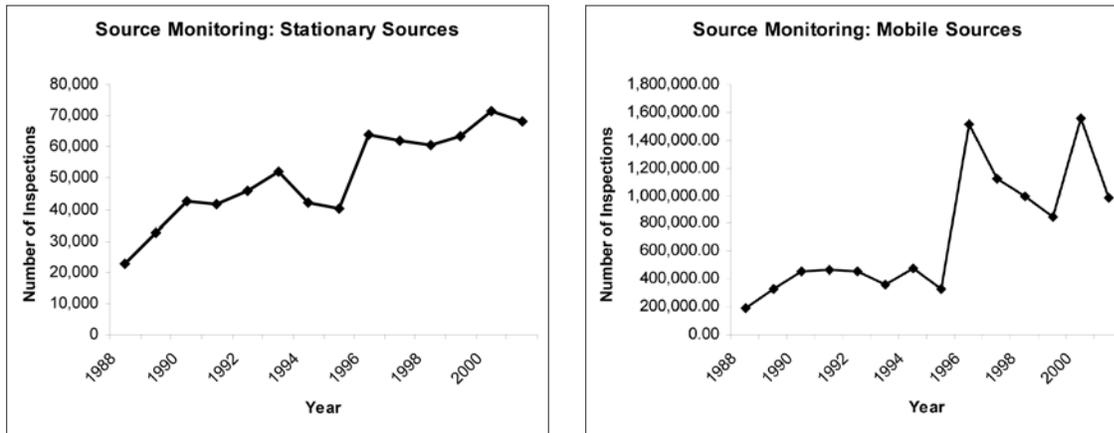
After several rounds of legislative deliberations and a court decision, TEPA substantially revised the rules supporting the administration of Article 10. Currently, Taiwan's air pollution control fee is assessed on automobiles, stationary sources, and construction sites. There are carefully scripted rules governing how the funds will be collected and apportioned, including statutes that require a committee with reserved seats for members of non-governmental organizations (NGOs) to oversee the fee's allocation and expenditure. The above rules were further refined at least seven times between 1992 and 1999 and placed in the next revision of the APCA in 1999 (*Huanjing Baohushu, Xingzheng Gongbao*, 1993, 1995, 1996, 1997, 1998).

The politicization of Article 10 led to significant improvements in Taiwan's air quality through the better targeted fee system, and considerably changed the workload of the environmental agencies. One official from a local level Taiwan EPB spoke revealingly of how his job had changed when asked about the fee's impacts:

Before the pollution fee our jobs were pretty relaxed (*qingsong*). We would visit a factory once a month to ensure that abatement equipment was operable and that there were no extreme incidences of emissions. After the introduction of the air pollution fee, our workload exploded. We were now visiting the large polluters once a week to make sure that we were measuring emissions correctly.... We are also now forced to improve our human resources management, as we now have more employees and a heavier monitoring load (Interview File 4, 2005).

Demonstrating that his comments reflect broader trends, data from Taiwan's environmental yearbook show that there has been a significant rise in monitoring of stationary and mobile sources after implementing rules were released in 1995 (See Figure 1). (*Zhonghua Minguo*, 2002).

FIGURE 1.



CONCLUSION: THE DIFFERENCE A LEGISLATURE MAKES

The increased monitoring leads back to the argument advanced in the introduction. On Taiwan, the establishment of a truly representative legislature altered the rules of the political game (*youxi guize*). On the one hand, reforms to the Legislative Yuan made it easier for environmentalists to articulate their interests and perhaps slowed the regulatory reform process; on the other, it has made policymakers increasingly accountable, creating an electoral linkage between a representative's job security and the success or failure of a new regulation. When that success or failure hinges on the performance of bureaucratic agents, it is not surprising that legislators have focused their energies on clarifying the administration of Taiwan's market-driven regulations.

Notably, the Environmental Protection and Natural Resource Committee (EPNRC) of China's National People's Congress (NPC) also has pushed for provisions bolstering the administrative rules in China's air pollution regulatory regime. However, comments from the NPC's EPNRC on the recent revisions of the 1995 and 2000 Air Pollution Control Law (APCL) are less about instituting new regulations, than closing administrative loopholes in old ones (Lin, 1995; Qu, 2000).⁵ This may augur well for China, as it has already accrued significant experience with emissions fees and appears primed to expand its local-level experiments with emissions trading. But it is nonetheless important to emphasize that the NPC is still a developing legislature that is

accountable to other agencies within the state, not society (Alford & Libeman, 2001).⁶ Overall, weak EPBs in China continue to be ineffective in preventing growing pollution problems in China.

These caveats notwithstanding, the growing assertiveness of the NPC and the institutionalization of the Legislative Yuan may also represent an opportunity for the leadership on both sides of the Taiwan Strait to consider something else that China and Taiwan share in common—the need to undertake more political reforms to strengthen their environmental governance systems. Specifically, tightening the relationship between environmental regulation and administrative rules is less about the language in policies than how accountable political institutions make policymakers. Recognizing that such a relationship transcends physical boundaries and historical enmities may also open up possibilities for further cross-straits cooperation on air pollution, as well as other issues where dialogue on like interests and complementary concerns would be mutually beneficial. Less ambitiously, it might make it easier to run in Taiyuan.

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REFERENCES

- Alford, William P. & Liebman, Benjamin. (2001). "Clean air, clean processes? The struggle over air pollution law in the People's Republic of China," *Hastings Law Journal*. 52. pp. 703-747.
- He Peiru. (1996, May 1). "Liwei jianyi tingzheng kongwufei. (Legislators recommend halting pollution fee)." *Jingji Ribao*. p. 15.
- Huanjing baohushu, xingxheng yuan gongbao* (Taiwan environmental protection agency, executive yuan bulletin). (1993, 1995, 1996, 1997, 1998).
- Interview File 1. (2005, August). Interview with official from Taiwan environmental protection agency.
- Interview File 3. (2005, September). Interview with official participating in the design of Taiwan's post-democratic regulatory reforms.
- Interview File 4. (2005, August). Interview with official from Kaohsiung environmental protection bureau.
- Lin Rongtang. (1995, September). "Guanyu <<Zhonghua Renmin Gongheguo daqi wuran fangzhifa (xiugai caoan)>> de shuoming. An explanation of the revised draft of the air pollution control law." *Zhonghua Renmin Gongheguo quanguo renmin daibiao dabui changwu weiyuanhui*. pp. 13-20.
- Qu Geping. (2000, January). "Guanyu <<Zhonghua Renmin Gongheguo daqi wuran fangzhifa (xiugai caoan)>> de shuoming. An explanation of the revised draft of the air pollution control law." *Zhonghua Renmin Gongheguo quanguo renmin daibiao dabui changwu weiyuanhui*. pp. 206-213.
- Reardon-Anderson, James. (1992). "Pollution, politics and foreign investment in Taiwan: the Lukang rebellion." Armonk: M.E. Sharpe.
- Research Notes 1. (2001, July). Meeting with officials from Taiyuan environmental protection bureau, Chinese research academy of environment science, Asian development bank, and U.S. environmental protection agency.
- Shaw, Daigee & Hung, Ming-Feng. (2001). "Evolution and evaluation of air pollution control policy in Taiwan," *Environmental Economics and Policy Studies* 4(3), pp. 141-166.
- Tang, Dennis Te-Chung. (1994) "The environmental laws and policies of Taiwan: a comparative law perspective," *Pacific Rim Law and Policy Journal*, 3, pp. S-89-S-144.
- Tang, Shui Yan & Tang, Ching Ping. (2000). "Democratizing bureaucracy." *Comparative Politics*. 33(1). pp. 81-99.
- Yeh Jiunn-Rong. (1993). *Huanjing zhengce yu falu. (Environmental policy and law)*. Taipei: *Guoli Taiwan Daxue Yesbu Bianji Weiyuanhui Bianji*.
- Zhang Guangren. (1996 August 25). "Kongwufei zhengshou yu yunyong zhi zhengyi, (The conflict over the air pollution fee collection and use)." *Minzhong Ribao*.
- Zhonghua Minguo Taiwan diqu huanjing baohu tongji nianbao*, Yearbook of environmental protection statistics Taiwan area, the Republic of China. (2002). Taipei: Xingzhengyuan Huanjing Baohushu. p. 1-7.

NOTES

1. Taiwanese policymakers have discussed emissions trading since 1986. As early as 1992 provisions were included in the Air Pollution Control Act for intra-firm trading bubbles (but not between firms). Pilot projects were undertaken beginning in 1999.
2. While their vocabulary was slightly different, local environmental officials on both sides of the straits see local administrative obstacles as the "key barrier" (*guanjian de zhanai*—in Taiwan) or the "core problem" (*hexin de wenti*—in China) frustrating local level air pollution control enforcement.
3. See Yeh for an early history of the development of Taiwan's environmental legislation and Reardon-Anderson for social movements that motivated the leadership to take environmentalism seriously.
4. Tang is sharply critical of Taiwan's air pollution legislation in the early 1990s. Note that Tang is comparing Taiwan's regulatory regime with the United States.
5. Note that comments from Lin Rongtang and Qu Geping focus on strengthening management and enforcement of regulations.
6. Alford & Liebman are not convinced that the EPNRC will be able to exert a meaningful influence on legislation.

COMMENTARY

A New Model for Chinese Rural Development? Industrial Agriculture and Renewable Energy in Rural China

By Ben Greenhouse

Over the last two decades, China's economy has witnessed unprecedented double-digit rates of annual growth—10.2 and 11 percent in the 1980s and 1990s, respectively (World Bank, 2001). The average annual rate of expansion slowed slightly between 2000 and 2003, but—at 8.25 percent—remained markedly higher than either Canada or America, at 3 and 2.5 percent, respectively (World Bank, 2005). The environmental and social hazards of such booming growth seems to be understood by the Chinese government, which has been trying since 2003—unsuccessfully—to slow this growth by tightening monetary policy, reducing spending on capital projects, taking measures to slow lending, and reducing the liquidity in the market by issuing bonds and bank notes (Bremner, Balfour, & Roberts, 2005; DOE, 2004). Despite these measures, the growth rate in 2004 remained at a high of 10 percent (World Bank, 2005).

MIND THE GAP—URBAN/RURAL INEQUALITY IN CHINA

With this rapid development has come growing inequality; during the first wave of market reforms from 1978 to 1992, income equality throughout China remained relatively constant, however the second phase of reforms starting in 1993 brought increasing inequality, particularly between rural and urban areas (Bhalla, Yao, & Zhang, 2003). While some of this imbalance can be attributed to a general decline in world agricultural prices that has disproportionately impacted rural areas (Benjamin, Brandt, & Giles, 2005), the problem has been compounded by the lack of rural non-farm employment and barriers to urban employment



The Cang Dong biogas digester (*shui feng chi*) has a massive "floating" cap, which gets pushed up by the biogas. The cap is weighed down by cinderblocks, creating pressure sufficient to drive the gas the 2 kilometers to the village and the electricity generator. © Ben Greenhouse

markets raised by the *hukou* (resident registration) system (Liu, 2005; Khan & Riskin, 2005).

Rural residents are becoming increasingly impatient with the growing divide between themselves and their urban counterparts, as evidenced by an increased incidence of rural unrest over the past few years and the every-increasing mass migration of residents to urban areas (McGregor, 2005). In an effort to reduce this disparity and stem the tide of migration, the central government has undertaken

various campaigns and new policies to improve rural economic opportunities, such as relaxing *hukou* regulations, building major transportation and electricity infrastructure (most notably under the Go West campaign), and investing heavily in rural economic development projects (Zou, 2005). Unfortunately, many of these rural infrastructure and development projects have had adverse effects on local environmental conditions (Muldavin, 1997; Economy, 2002). However, some government-led projects have recognized the need for sustainable development and produced environmentally friendly results. Most notable have been the little heralded rural biogas initiatives that have been underway since the 1970s.

EXPLORING SUCCESSFUL RURAL BIOGAS INITIATIVES

From late 2004 to early 2005, I conducted four months of research on a biogas project in Cang Dong, a small village in the north of Hainan Island. This project is a unique example of a new, more environmentally friendly model of rural development incorporating commercial agriculture with a large-scale biogas plant that generates electricity for the farm while providing cooking gas to the nearby village.

In 1998, in an attempt to boost Cang Dong's stagnant economy, the village government permitted a national food company to establish the *Wan Tou* pig farm on village land. In return for the use of the land, Cang Dong acquired one million shares (approximately 8 percent) of the farm. Government at all levels heralded the partnership between local government and industry. However, soon after the farm was established, environmental problems began to surface; the farm was releasing 250 tons of waste from 10,000 pigs into the local environment every month with minimal treatment. These emissions, coupled with the farm's proximity to the local reservoir, resulted in severe contamination of the village's water supply. Moreover, air pollution from the farm caused the village—approximately 2 kilometers from the farm—to smell badly of pig excrement. The villagers and their government protested this pollution, prompting the provincial government to give the pig farm an ultimatum: solve the problem within two months or the farm would be closed.

In response to this ultimatum, the pig farm contracted Hainan Huafu Environmental Engineering Company Ltd. to design and build a water

treatment plant for their liquid waste. The resulting design generated biogas from the farm's liquid pig waste as part of the treatment process.

Biogas—methane gas produced from animal and human waste combined with crop residues—has been used in China for more than sixty years in various forms, the most common of which are small household digesters producing gas for cooking and minor illumination. The substitution of biogas for other cooking fuels can benefit households both economically and in terms of health (Wang & Li, 2005).¹ Furthermore, the solids remaining after the biogas production are an ideal source of naturally derived fertilizer for agricultural purposes. Recognizing these benefits of biogas, since the late 1990s the Hainan provincial government has offered 1,200 Yuan (\$150) worth of subsidies to households wishing to install biogas systems. This promotion of biogas has been very successful, and by 2003 110,000 household biogas digesters were operating in Hainan.

In Cang Dong, the water treatment plant uses a much larger digester than the typical subsidized household biogas systems operating on Hainan. (See Photo 1). This digester produces 800 cubic meters (m³) of biogas per day from the pig farm's waste. The biogas is used to power a generator that provides approximately 80 percent of the farm's electricity. The electricity is sold back to the farm at roughly half the price of grid-supplied electricity—providing substantial savings to the farm and a source of income to the treatment facility—while the solids generated in the digestion process are sold to nearby farmers as natural fertilizer. The plant's electrical generator only consumes 75 percent (600 m³) of the biogas produced by the waste treatment plant. The treatment facility offered the surplus gas to the villagers if they would build the pipeline to carry the gas from the farm to the village at a cost of 270,000 Yuan. In an inventive step, the village pooled the provincial biogas subsidy available to each household in order to raise 128,400 Yuan. The remaining funds were borrowed from the pig farm with the village's ownership in the farm serving as collateral. The resulting pipeline—finished early in the fall of 2004—delivers 1.2 m³ of gas per day to each of the 107 of the households in Cang Dong, free of charge. This gas is used for cooking by local households (see Photo 2), replacing liquefied natural gas for an estimated yearly savings of approximately 720 Yuan per year per household (almost 20 percent of a villager's annual income).



A typical biogas installation in a household kitchen.
© Ben Greenhouse

THE “3-POINT” MODEL OF RURAL DEVELOPMENT

The central government is promoting the biogas plant at Cang Dong as the first example of a new “3-point” model of rural development, combining the treatment of waste from commercial agriculture with biogas technology to produce cooking gas for nearby villages. Since the project’s completion, two similar plants are underway in other provinces. The central government recommends (but does not yet require) that this technology be used at any farm with more than 10,000 pigs. The technology used in Cang Dong is not overly expensive or complex; construction of the entire water treatment plant cost only 2,000,000 Yuan and is predicted to pay for itself in 3 to 4 years, with an operational lifespan of 10 to 15 years before any major maintenance is required. Furthermore, in an effort to reduce the use of chemical fertilizers, the central government has set a target that 60 percent of all fertilizers be naturally derived within the next 3 to 4 years. Solids from biogas plants such as Cang Dong’s will become an important source of this fertilizer. This new “3-point” model impacts three areas

of concern to the Chinese government: rural participation in the market economy, an increase in the quality of life of rural residents, and environmental protection. Addressing the former two areas without adversely affecting the latter will help China slow the growth of urban/rural inequality and stem the tide of rural emigration, which threatens to engulf Chinese cities.

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REFERENCES

- Benjamin, Dwayne; Brandt, Loren; & Giles, John. (2005). “The evolution of income inequality in rural China.” *Economic Development and Cultural Change*, 53(4), 769-824.
- Bhalla, Ajit S.; Yao, Shujie; & Zhang, Zongyi. (2003). “Causes of inequalities in China, 1952 to 1999.” *Journal of International Development*, 15, 939-955.
- Bremner, Brian; Balfour, Frederik; & Roberts, Dexter. (2005). “Beware of hot money: With foreign cash piling in, China’s economy could boil over.” *Business Week*, 3927, 52-55.
- Department of Energy [DOE]. (2004). China Country Analysis Brief. [Online]. Available: <http://www.eia.doe.gov/emeu/cabs/china.pdf>.
- Economy, Elizabeth. (2002). “China’s go west campaign: Ecological construction or ecological exploitation.” *China Environment Series*, Issue 5, 1-12.

- Ezzati, Majid; & Kammen, Daniel M. (2002). "Household energy, indoor air pollution and health in developing countries." *Annual Review of Energy and the Environment*, 27, 233-270.
- Khan, Azizur Rahman; & Riskin, Karl. (2005). "China's household income and its distribution." *The China Quarterly*, 182, 356-384.
- Liu, Zhiqiang. (2005). "Institution and inequality: The *hukou* system in China." *Journal of Comparative Economics*, 33(1), 133-157.
- McGregor, Richard. (2005, September 8). Cultivating the countryside: Hu takes pains to keep China free from a peasants' revolt. *Financial Times*, page 13.
- Muldavin, Joshua. (1997). "Environmental degradation in Heilongjiang: Policy reform and agrarian dynamics in China's new hybrid economy." *Annals of the Association of American Geographers*, 87, 579-613.
- Wang, Xiaohua; & Li, Jingfei. (2005). "Influence of using household biogas digesters on household energy consumption in rural areas: A case study in Lianshui county in China." *Renewable and Sustainable Energy Reviews*, 9, 229-236.
- World Bank. (2001). *World Development Report 1999/2000*. (Washington, DC: World Bank).
- World Bank. (2005). WDI Data Query. [Online]. Available: <http://devdata.worldbank.org/data-query/>
- Zou, Hanru. (2005, November 25). "Widening urban-rural disparities." *China Daily* [Online]. Available: http://www.chinadaily.com.cn/english/doc/2005-11/25/content_497838.htm.

NOTES

1. In areas where liquefied natural gas is used as a cooking fuel, the substitution of biogas results in considerable savings. In areas where other biomass sources (e.g. dung, wood, straw) are used, economic benefits are realized as timesavings due to the reduced need for fuel gathering activity. Indoor air pollution from the combustion of biomass for cooking is one of the leading causes of disease and mortality in developing countries (Ezzati & Kammen, 2002).

Prospects for Developing Meaningful Public Participation in Environmental Decision-making in China

By Christine Chung

Social unrest in China has been visibly on the rise, with official Ministry of Public Security figures citing approximately 74,000 so-called “mass incidents”—demonstrations or actual riots—in the first half of 2005, an increase from 58,000 the year before, and only 10,000 a decade ago.¹ Some of these protests are sparked by a growing awareness among citizens of their legal rights and a failure of more formal channels to address their complaints.

Protests and registration of complaints usually are triggered by corruption or abuse of power by local officials—the most common being land seizures that dislocate farmers without adequate compensation and uncontrolled pollution that destroys the livelihood of rural citizens. Local and international news media have covered many of these incidents, including the April 2005 riot of thousands in Huaxi village in Zhejiang Province, which was sparked when police attacked elderly protestors who had been blocking the entrance of a highly polluting industrial park. Chinese officials have turned to promoting public participation as one means to mitigate tensions that produce such violent incidents. Thus, over the past few years some citizens have been turning to litigation and other forms of non-violent protest. While the forms of formal citizen participation in China remain highly controlled and limited both in scope and impact, recent laws and trends in the environmental protection sphere indicate growing government expectations of a more meaningful role for the public that ultimately could further expand political space in China.

THE PROMISING ARENA

Environmental protection is one promising arena for advances in public participation, for not only are there growing incidents of serious citizen discontent about

pollution, but the State Environmental Protection Administration (SEPA) is actively advocating greater citizen voice, although this is a major challenge since it is contesting for power against other government bodies with more resources and clout. Moreover, in the environmental sphere a grassroots civil society has been evolving since 1994 when registration of nongovernmental organizations (NGOs) was legalized. Over the past twelve years China has witnessed the emergence of a myriad of green NGOs that are strengthened by a growing number of academic advocates and interested individuals.

NDI's Public Participation Work

Since 2000, the National Democratic Institute for International Affairs (NDI) has been engaged with various Chinese partners interested in increasing public participation in environmental decision-making processes from lawmaking within the provincial and municipal people's congresses to community-level activities in urban neighborhood committees. In 2002, NDI began working with local environmental protection bureaus (EPBs) throughout China to share experiences on public participation in environmental governance. China's initial experiences with formal public hearings are an opportunity to understand some of the complex issues that challenge modern China as the government attempts to balance conflicting demands for ongoing economic development, better environmental protection, liberalization of political rights, and maintaining both party hegemony and party legitimacy.

China's legal framework for environmental governance now explicitly allows for public participation. The Environmental Impact Assessment (EIA) Law and the interim measures on the permitting process have requirements for public participation

in some circumstances. EPBs have created a variety of forms of public participation, ranging from the availability of phone hotlines for complaints, to questionnaires for affected populations, and actual formal public hearings. China's EPBs appear to regard these measures as opportunities to increase both the efficacy of their work and the legitimacy of their actions. In August 2004, the Beijing EPB conducted the first administrative hearing under the new EIA permitting process to determine the fate of the Baiwang Jiayuan power lines. After this hearing in November 2004, SEPA Vice-Minister Pan Yue announced the development of a system to hold hearings on large-scale and controversial projects. In April 2005, SEPA followed with its first public hearing on the EIA for the lake restoration project at the Old Summer Palace in Beijing. The lake restoration and power line hearings were animated and hotly contested affairs, which sparked EPBs around China to begin experimenting more with hearings.

The Tai'an City Hearing

In September 2005, NDI was invited to attend and provide feedback on an environmental permit hearing in Tai'an city in Shandong Province as part of an international seminar on citizen participation in environmental protection in the province. According to Shandong officials, the province ranks second in energy consumption in China—surpassing both Jiangsu and Guangdong—and suffers from water shortages and tremendous pollution emissions from its cement, paper, chemical, and other industries. The provincial authorities appeared to be enthusiastic about the promise of greater public participation in environmental governance, with senior representatives from the provincial legislature and legal offices joining EPB officials in the two-day seminar. During the seminar, Shandong officials boasted about their public participation innovations, from open legislative meetings (for which they pay the travel expenses for observers from outside the capital city Jinan) to e-governance.² Moreover, the provincial EPB has set up a fund to reward citizens who report pollution violators (currently capped at 2,000 Yuan) and its Environmental Dissemination and Education Center has unveiled a publicly disclosed ratings system of enterprises to assess their compliance with emissions standards.

Chaired by the deputy director of the Tai'an EPB, the hearing on the construction and upgrading of technology at a local, highly polluting textile company was held at the Dongyue Hotel. Lasting just

over an hour, the hearing was a stiffly orchestrated event that the organizers willingly acknowledged to having rehearsed days earlier with representatives of the company and affected villagers. During the hearing, the EPB endorsed the EIA analysis, stating that the changes would comply with regulations on wastewater discharge, particulate emissions, and noise pollution. The village representatives asked questions essentially seeking assurances that the new

// **...the hearing was a stiffly orchestrated event that the organizers willingly acknowledged to having rehearsed days earlier with representatives of the company and affected villagers.**

equipment would be run properly and that water quality would be monitored. One villager asked whether the factory's wastewater could be used for irrigation after the changes, to which the research institute official responded that the water did not meet the national standards for irrigation usage and would be discharged into the river. This exchange predictably appalled the "foreign experts" whose participation in the seminar was facilitated by NDI.

Although the hearing was something of a *pro forma* affair, it demonstrated to EPB officials the magnitude of the challenges they face in institutionalizing these types of public participation mechanisms. The director of the Legal Affairs Office of Shandong Province explained that the EIA Law says nothing about the results of the hearing while commenting that they were still at the initial stages of protecting citizens' rights. When one of the international participants pointed out that there were no women participating in any part of the hearing, the deputy director of the Tai'an EPB said the villagers should be faulted, as they did not choose to have any female representatives.

After the seminar, the local news media sought out the "foreign experts" for commentary on their views of the hearing. Beyond the absence of women and the dumping of wastewater, the international

participants noted that Chinese citizens remained at a disadvantage for understanding the technical dimensions of EIA hearings vis-à-vis the EPBs and companies—unless resources were provided to level this imbalance. They also noted that the role of environmental protection agencies differ in the United States, where they would comment on the adequacy of the analysis rather than make a recommendation in the hearing. Moreover, hearings in the United States tend to be much more contentious with citizens making specific demands.

THE CHALLENGES

The development and eventual institutionalization of hearings and other forms of citizen participation in China's evolving environmental governance system will depend on numerous factors. Ultimately, complementary legislation and implementation of practices to allow citizens adequate access to information and protection for whistleblowers will be necessary for truly meaningful citizen participation to take root. At the same time, China's civil society will need to keep pace and expand its capacity to be able to take advantage of these opportunities and coalesce interests into coherent voices with strategic plans. International NGOs, including NDI, have been providing training and technical assistance to some Chinese NGOs on the public hearing processes, but whether these efforts start to impinge on the comfort level of Chinese authorities remains to be seen. While civil society groups attempt to play a more significant role in hearings and other institutionalized mechanisms, the government needs to facilitate their engagement in the process by providing appropriate information in a timely manner and allocating resources to bridge the technology gap to help citizens and environmental NGOs better understand highly technical data.

At present, Chinese officials seem preoccupied with stoking the interest of citizens in these new institutions for participation. The quality of these opportunities, however, remains somewhat questionable. In various seminars and conferences over the years, including the Shangdong EIA hearing described above, NDI staff was often asked how organizations might better utilize the results of hearings or how they could ensure the effectiveness of hearings. In democratic systems, the answer is fairly straightforward; in China it is understandably not, since so much of the necessary legal

and political infrastructure is not yet in place. A follow-up question from officials might soon be how to sustain citizen interest in the process if satisfactory results from participation are missing. And ultimately, what are the hazards of form over substance? Without major improvements, the new public participation mechanisms will not slow the growing trend in protests.

CONCLUSION

The challenges confronting China's local EPBs as they implement public participation regulations are enormous—from specific problems about dispersal of authority and information across numerous agencies and over various administrative borders to the more generalized problem of China's attempts to superimpose a rule of law regime over traditional institutions such as the letters and complaints system. In fact, what was made clear in the Beijing EPB's experience were the difficulties associated with opening up the channels for citizen participation but not being in a position to remedy the grievances citizens want addressed. In the case of the Baiwang Jiayuan power lines, the Beijing EPB's role was to examine their environmental impact, whereas the affected citizens wanted to discuss the potential negative influence on their economic investments and the aesthetic offense of power lines so close to a cultural heritage monument.

The disconnect between the visions of EPBs and citizens on what issues public participation is supposed to address remains quite large. Nevertheless, the acceptance of citizen participation as both a necessary and desirable tool in environmental governance is a solid development that holds great promise for creating a functioning environmental governance system. In the first exchanges on instituting public hearings in 2000, NDI staff observed debates by provincial People's Congress officials on the merits of citizen participation in the lawmaking process. Numerous local representatives felt

// The disconnect between the visions of EPBs and citizens on what issues public participation is supposed to address remains quite large.

that academics would be better positioned to represent the views of “common folk” who would not be articulate enough to voice their own opinions. The debate appears to have moved on, and these days NDI seldom hears impassioned speeches defending the right of peasants to be heard. Shandong Province is in the process of enshrining in legislation the right of all citizens to be involved in the environmental governance process. The Shandong EPB recently passed the “Measure on Citizen Participation of Shandong Environmental Protection,” which it has submitted to the provincial People’s Congress in order for it to gain the status of local law. Over time the normative value of these types of measures could go far in lessening conflict and improving environmental quality in China.

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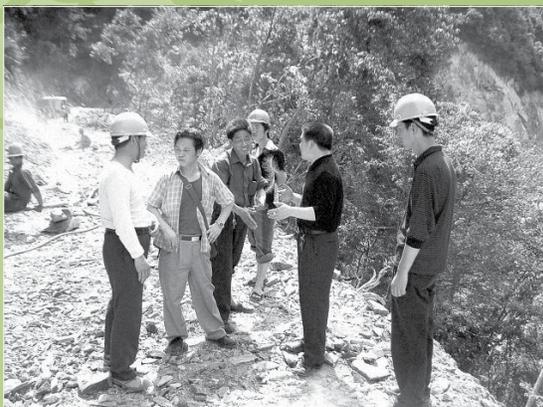
1. For one of many articles on these protests see: French, Howard W. (2005, August 23). “Land of 74,000 Protests (but Little Is Ever Fixed).” *The New York Times*. [Online]. Available: http://www.howardwfrench.com/archives/2005/08/24/land_of_74000_protests_but_little_is_ever_fixed/.

2. While the provincial government’s e-governance website is still a work in progress it will eventually include: (1) information on the legislative process and an email account that accepts public opinion on upcoming legislation, (2) an email hotline for law enforcement, (3) information on a green community development project with participation by schools, (4) a public environmental education campaign, and (5) news reports that monitor industrial accidents and report on the resolution of environmental disputes. Via traditional news media the province is sponsoring TV announcements on the air quality of 17 cities and publishing monthly water quality statistics in the newspapers.

SPOTLIGHT ON NGO ACTIVISM IN CHINA

Pingnan Green Wins Court Case against Chemical Company

By Melanie Pitkin, Global Greengrants Fund



Pingnan Green Association has been partnering with the local environmental officials to halt illegal dam construction in a local nature reserve. © Zhang Changjian

In March 2006, the Pingnan Green Association, a grantee of Global Greengrants Fund, achieved an unprecedented victory against the Fujian-based Rongping Chemical Affiliated Company (*Rongping Lianying Huagongchang*), a part of China's behemoth Fuzhou Yihua Group. Five years after initial complaints were filed, an Intermediate People's Court in Fujian Province ordered the company, China's largest chlorate manufacturer, to pay the people of Xiping nearly \$85,000 in reparations for health and environmental damages. Despite the court ruling, the company still has not paid the villagers and the head of Pingnan Green Association—Dr. Zhang Changjian—continues to be harassed for his work to stop the pollution.¹

POLLUTION HAVEN?

In 1994, in the face of increasingly strict enforcement of pollution emission regulations and attracted by cheap hydropower, the management of Rongping Chemical moved a chlorate plant from the provincial capital of Fuzhou to Xiping village. The factory became Asia's largest manufacturer of potassium chlorate, which is used in matches, bleach, fireworks,

and disinfectants. Since the relocation, the plant has dumped sewage and waste residue containing chromium 6 and chlorine into the Xiping River. The plant produces one ton of waste residue containing chrome every day, turning the river bright green, orange, or black. The daily wastewater contains more than 20 times the amount of chromium-6 permitted by national standards, and the plant also has been releasing this dangerous pollutant into the air and soil. According to the U.S. Environmental Protection Agency, inhalation of chromium causes shortness of breath, coughing, and wheezing, as well as complications during pregnancy and childbirth; acute inhalation can cause gastrointestinal and neurological problems, and can hugely increase the risk of lung cancer.

To prevent the waste from seeping into the river, the company built a two-meter high wall. However, the wall was ineffective in preventing chrome from being washed off by rainwater. The factory ignored subsequent orders by local health officials to build a treatment pond to remove the chrome and other pollutants from the wastewater. The provincial environmental protection bureau (EPB) recommended the county government relocate the 24 families living within 130 meters of the plant, but the county deemed the plan too expensive.

SUFFERING IN THE COMMUNITY

Pollutants from the plant have ruined rice production in more than 11 hectares of nearby farmland, as well as stunted rice production in an additional 12 hectares; and valuable bamboo, fruit, and nut trees now fail to produce. In one instance, the factory leased a local farmer's land as a dump for powdery yellow and white waste, informing the farmer that the waste was a good fertilizer. Since Rongping's arrival, many of Xiping village's 2,000 residents have suffered from symptoms such as headaches, vomiting, nausea, dizziness, itchy skin, dry coughs, teary eyes, and hair loss; children have been developing

painful rashes and blisters. From 1990 to 1994, the village experienced only one cancer death—a stark contrast to the 17 cancer deaths between 1999 and 2001. According to studies conducted by Zhang Changjian, a local doctor, since 1994 life expectancy in Xiping has dropped from 68.3 years to 59.7. In a place where the average annual income is less than \$300, costly medicines and medical procedures are financially devastating.

GRASSROOTS ORGANIZING

The challenge of halting this pollution extends beyond just the managers of the Rongping Chemical Affiliated Company. The company has protectors in the local government, which is not surprising considering the county owns 30 percent of Rongping Chemical and gets a quarter of its revenue from taxing the company. Officials refuse to test water pollution samples taken by the villagers, claiming they are “unofficial” samples. In order to combat this huge corporation, the villagers, led by Dr. Zhang, formed the Pingnan Green Association and took the unusual step of filing suit against Rongping Chemical. The villagers donated \$1,600 to the lawsuit, but local police confiscated the money and beat two of the villagers who tried to resist. Initially, the lawsuit was completely ignored, but the case began to gain momentum with help from two Global Greengrants Fund donations and a free lawyer from the Center for Legal Assistance to Pollution Victims (a Beijing-based NGO). In April 2005, the court awarded the village \$30,000 in damages, but the villagers decided to appeal for more. In the appeal, 1,721 villagers joined the lawsuit, making it the largest environmental case ever in China.

ONGOING STRUGGLES

The court rulings have helped improve the lives of the villagers and embolden them to continue fighting for their rights to a clean environment. Since being permitted to register in 1994, China’s environmental NGOs have predominantly focused on relatively “safe” issues, but the Pingnan Green Association partnership with CLAPV highlights the growing influence grassroots groups are having in changing environmental governance in China. Since the second court ruling, the factory has improved its production methods, but still secretly dumps waste in the river and releases dangerous chemicals into the air. The river still cannot sustain fish and farmers have difficulty selling their produce, because Xiping is now known as a toxic area.

Despite continued harassment by local officials, Pingnan Green Association continues to monitor the factory and push to get the compensation awarded to the villagers. Pingnan Green Association also has begun working on other issues to protect the local ecosystem, such as partnering with the provincial EPB to halt illegal dam construction that threatens the fragile Yuanyangxi nature sanctuary and endangered species like the Chinese mandarin duck and macaque.

For updates on Pingnan Green Association see www.pnlszj.ngo.cn and for information on other grassroots groups supported by Global Greengrants Fund see: <http://www.greengrants.org>.

NOTES

1. Oster, Shai & Mei Fong. (July 19, 2006). “River of Tears.” *The Wall Street Journal*, page A1.

Agroforestry Systems in Northern China: Promoting Development and Environmental Improvement

By Dave Daversa

In 1987, China's State Forestry Administration named Heze prefecture in Shandong Province a model for its progress in expanding forested area. This accomplishment is impressive considering that in the 1950s, forested land in this prefecture ostensibly did not exist. Since the late 1970s, Heze and other prefectures in northern China have undertaken extensive afforestation efforts by converting farmland into intensively managed agroforestry systems. In Heze, the total forest coverage accounts for 313,000 hectares (ha) of mainly poplar trees. As a result of integrating fast growing and high yielding trees into the rural landscape, farmers are receiving larger monetary gains from their land, a regional wood product manufacturing sector is flourishing, and timber shortages in the area have greatly eased. Moreover, the region's ecological conditions have improved.¹ This paper discusses briefly the key national, regional, and local socioeconomic factors that have contributed to the evolution of agroforestry in northern China over the past twenty-five years, and some of the positive impacts this reforestation work has had on local livelihoods.

FACTORS DRIVING AGROFORESTRY DEVELOPMENT IN NORTHERN CHINA

National Household Responsibility System Policy

Since 1978, China has undergone a series of reforms involving decollectivization of land use and the liberalization of the economy. The organizational change in land tenure was initiated informally by farming households, and after recognizing the potential of this new organizational structure, the central

government adopted the Household Responsibility System (HRS) in 1978 (Lin, 1992; Wen, 1993). The HRS greatly increased the decision-making capabilities of farmers to market new crops and forestry products. Both agricultural and silvicultural production rose dramatically in Shandong and other provinces. In northern China many farmers used the HRS for agricultural innovation that led to today's booming agroforestry development.

Regional Resource Scarcity and Free Markets

Particularly rapid deforestation and inadequate forestation over the past fifty years has translated into high timber demand throughout China (Zhang et al., 2000a). Demand has been more pronounced in northern China due to intensive agriculture and deforestation over many centuries. Thus people living in the north have had little access to timber for construction material or fuel. This scarcity and the resulting high demand for forest products has been another important factor driving the development of agroforestry in northern China (Zhu, 1995).

Because forest resources were virtually nonexistent in the north, regional and local forestry administration offices were small and forests weakly monitored. Lacking strong government control, individuals in northern China took advantage of the free timber market. This economic freedom proved to be a key factor in agroforestry's success in the region once the HRS began (Yin & Xu, 2002). In southern and western China where the forestry administration was better established, forestry officials intervened in local timber markets, which resulted in lower profits and poorer incentives, thereby hindering agroforestry development (Lieberthal, 1997; Yin & Xu, 2002).



Hybrid poplar-wheat intercropping by a farmer in Heze.
© Dave Daversa

Local Government Innovation

Although the weak establishment of forestry administration sparked agroforestry development, active involvement of the local governments in northern China was crucial in helping to establish strong and sustainable agroforestry systems. In Heze, for example, the local government provided subsidies to farmers for land intercropped with poplar and other trees. Furthermore, during my visit to Heze I discovered that the local government provided poplar seedlings free of charge to approximately 95 percent of the households. The local government also offers financial support to people entering the wood products processing sector by providing low-cost electricity supply and low-interest loans. Taxes placed on these production systems have also been reduced. Farmers starting up agroforestry have benefited from government-run technical extension service centers that hold demonstrations on proper planting techniques and application of fertilizer.

During my survey of farmers in Heze, they continually highlighted the local government's role in promoting research and technology to strengthen their work. Specifically, the local government supported research into the biological performance of the fast growing and hybrid poplars. Over 200 varieties of poplar have been collected from Italy and North America, and experiments with these species are being done throughout north China. By investing in hybrid poplar research, Heze and other local governments are seeking the best performing species possible to maximize timber production.

In addition to making advancements in poplar biotechnology, the affordability and rapid growth

characteristics further explain why poplar intercropping has been widely adopted throughout Heze and other regions of northern China. These fast-growing poplar trees allow farmers to realize the economic returns from the timber in short rotations. (See Photo 1). This rapid turnover rate, combined with the sustained output of the intercropped annual crops, and the financial assistance provided by local governments have given farmers a more affordable means of producing timber on their farm lands.

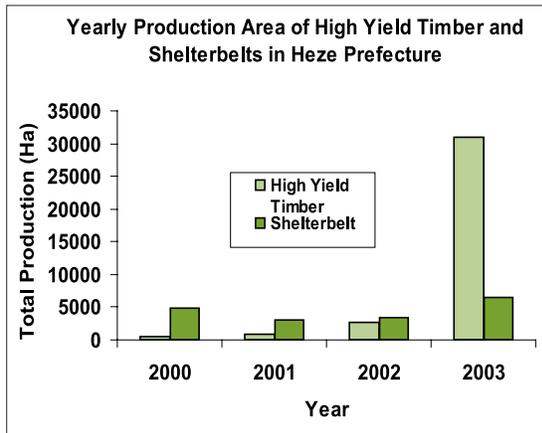
THE IMPACTS OF AGROFORESTRY

Socioeconomic Impacts

In Heze, 40 percent of the total cultivated land is being used for commercial agroforestry systems, and officials plan on further bolstering this figure. Of the total forest coverage in the prefecture, 76 percent is managed as intercropping systems, whereas shelterbelts account for 3 percent. Figure 1 illustrates the pronounced increase in high yield timber production in Heze over the past four years. During my visit to this area, farmers reported that the income they obtain from their land has increased by 30 to 70 percent as a result of inter-planting hybrid poplar into their fields. Farmers have continued to grow wheat, corn, peanuts, alfalfa, and other annual crops in between the rows of poplar to maintain a sustained supply of food and income, despite depressed yields due to the shade effect of tall trees. In addition, the intercropped poplar trees have allowed farmers to spend more time away from the fields and partake in other jobs. Finally, the expansion of agroforestry systems in this region has promoted the development of a small-scale wood products manufacturing sector. Many farming households have moved off of their farms to pursue this prosperous business.

The wood products manufacturing sector in China has boomed in recent years. For example, the provinces of Hebei, Shandong, Jiangsu, and Zhejiang currently supply 68 percent of the total national production of wood-based panels. Currently 28,000 mills are established within Heze employing a total of 500,000 villagers. Heze also boasts over 3,000 wood products manufacturers that process the local timber, of which over 90 percent are household based. The total wood used in Heze is approximately 6 million cubic meters per year with an annual processing value of \$0.85 billion. As a result, employment opportunities and incomes have risen considerably for many villagers. These

FIGURE 1.



The sharp rise in high yield timber production area illustrates the success of local government efforts to emphasize poplar intercropping.

Source: Shandong Statistics Bureau

profitable companies have enabled farmers to make further investments in the sector so their businesses can continue to grow.

The sizes of these manufacturing plants vary; one village in Heze has a private household operation with one production line and another large mill with three production lines. Household plants primarily produce unfinished veneer or wood panels, whereas the mills often take the processing a step further to develop more refined products like plywood and fiberboard. According to forestry officials, much of the finished products are sold locally as furniture, paper, and panel boards. However, when I surveyed



Two local women kneeling amongst large stacks of wood panels that a household enterprise of wood-products manufacturing has produced from poplar and paulownia logs. © Dave Daversa

household manufacturing operations and mills, the workers told me that many of their wood products were exported to Korea or Japan to be further processed into furniture or plywood.

ENVIRONMENTAL IMPACTS

Although farmers have developed commercial agroforestry systems primarily to improve their economic situation, this reforestation also has positively impacted local environmental conditions. The shelterbelt systems in northern China have effectively decreased the harmful effects of wind—often reducing wind velocity by as much as 40 percent (Zhang et al., 1995). In Heze, the extensive establishment of shelterbelt and poplar intercropping systems has reduced the harmful effects of the strong, hot and dry winds on wheat yield and quality. An additional environmental service provided by integrating trees into agricultural lands is carbon sequestration. Studies have been conducted on the potential for fast-growing trees, like the poplar and paulownia that are integrated into the agricultural lands in northern China, to act as carbon sinks (Montagnini & Porras, 1998).

CONCLUDING REMARKS

The prefecture of Heze and other areas in Shandong have seen widespread establishment of commercial agroforestry systems, which has been accompanied by positive economic, social, and environmental benefits. Due to the success of these systems, the local government is hoping to expand the amount of farmland in agroforestry and the wood products manufacturing sector. Over 330,000 ha of farmland will be utilized in the future for timber production in Heze. Furthermore, officials anticipate that the advancement of technology and scientific research will continue to increase yields.

Despite these large plans for expansion, certain limiting factors in development exist that villagers and government officials should consider. For example, as the wood products sector expands to international markets, officials must be careful to ensure that the local community continues to profit. From a biological standpoint, officials and farmers should carefully monitor these single-tree species forests for pest and disease outbreaks so that large-scale crop damage does not occur. Moreover, further scientific and socioeconomic studies should be conducted on the commercialized agroforestry

systems in northern China. With the advancement of research in this area, the long-term sustainability of agroforestry and its associated small-scale wood processing sector could become even more significant.

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REFERENCES

- Lieberthal, K. (1997). "China's governing system and its impact on environmental policy implementation." *China Environment Series*, 3-8.
- Lin, J.Y. (1992). "Rural reforms and agricultural growth in China." *American Economic Review*, 81(1), 34-51.
- Montagnini, F., Porras, C. (1998). "Evaluating the role of plantations as carbon sinks: An example of an integrative approach from the humid tropics." *Environmental Management*, 22(3), 459-470.
- Shandong Statistics Bureau. 2000-2004. *Shandong yearbook*. Jinan, China.

Wen, G.J., (1993). "Total factor productivity change in China's farming sector: 1952-1989." *Economics Development Cultural Change*, 42 (1), 142.

Yin, R. & Xu Jintao. (2002). "A welfare measurement of China's rural forestry reform during the 1980s." *World Development*, 30(10), 1755-1767.

Zhang H, Brandle J.R., Meyer, G.E., Hodges L. (1995). "A model to evaluate windbreak protection efficiency." *Agroforestry Systems*, 29, 191-200.

Zhang, Y., Uusivuori, J., Kuuluvainen, J. (2000a). "Impacts of economic reforms on rural forestry in China." *Forest Policy and Economics*, 1, 27-40.

Zhu, Z.H. (1995). "Role of agroforestry in degraded areas." In Panjab, S., Pathak, P.S., Roy, M.M. (eds.). *Agroforestry Systems for Sustainable Use*. New Hampshire: Science Publishers, Inc., pp. 70-74.

NOTES

1. Interviews with Mr. Chu Zhongting, an official of the Heze prefectural forestry department, 4-6 June 2005.

On the Way Towards Eco-villages: Upgrading Energy Systems in Rural Hainan

By Lei Bi and Murray Haight

China's booming coastal urban areas are the main energy consumers in China—coal-burning for electricity and private cars filling city streets are not only creating local, health-threatening air pollution, but also SO₂ and greenhouse gas emissions that have global impacts. While urban air quality trends are grim, an equally serious energy consumption problem exists in the developing rural areas of China, where people remain highly dependent upon traditional sources of fuel, exacerbating deforestation and grassland destruction. Among the 1.5 billion people who rely on firewood to meet their cooking needs around the world, 50 percent of them live in rural China (He et al., 2001). Due to an increasing need for energy, the acceleration of deforestation and biomass consumption has become one of the main activities hindering the vision of sustainable development in rural China.

Heralded as “China's Hawaii,” the province of Hainan Island is the country's largest special economic zone (SEZ) in land area and population (more than seven million). Unlike other Chinese SEZs, Hainan is still dominantly rural and more than 80 percent of its population are farmers (Han, 1997). Similar to the other fast-growing SEZs, however, Hainan has been experiencing problems of widespread environmental damage. Most serious has been the loss of mangrove areas due to coastal development and deforestation caused mainly by rural citizens relying on biomass as their major source of fuel (Zhao, Liu, & Lin, 1999; Han, 1997). Rapid population growth, increasing incomes, agricultural development, and improving living standards have all contributed to the increase in demand for forestry resources for energy. However, the associated deforestation activities have resulted in energy consumption beyond the regenerative capacity of forests in rural Hainan (Hainan Department of

Land Environment and Resources [HLER], 1999). Consequently, rural Hainan is caught in a vicious cycle of consumption and degradation with rapidly degrading forest resources becoming one of the main constraints to economic growth.

PROVINCIAL VISIONING AND EFFORTS ON “ECO-VILLAGE”

In 1999, in order to take an integrated approach to resource management, the provincial government formulated an “Eco-Province Strategy,” aimed at building Hainan into the first “Eco-Province” in China (HLER, 1999). Since Hainan is mostly rural, the key to the success of the strategy was to create what was dubbed “civilized and ecological villages” (CEVs) across the province (Hainan Civilization-Ecology Office [HCEO], 2002). The eco-village strategy aims to turn half of the villages into CEVs within five to eight years. The main objectives of the strategy have been to improve environmental and economic conditions for rural citizens by creating an “ecological culture” (i.e., establishing new norms that prioritize resource conservation) (HCEO, 2002).

The provincial government has identified upgrading the energy consumption systems in rural Hainan as a key foundation to successful implementation of the CEV strategy. Utilization of renewable energy—solar, biogas, and wind—is being encouraged by government subsidies that enable rural households to adopt small-scale renewable energy technologies. In the summer of 2003, a survey conducted by the authors revealed that a large number of villages across Hainan already have adopted small-scale renewable energy technologies with subsidies. As one of the earliest model CEVs in the province, the residents of Meiwan Xincun village (Meiwan village) in Heqing township have carried

out very successful renewable energy technology adoption and diffusion practices, which have freed them from using local timber for energy. With the halt of timber cutting, local forests are recovering from decades of deforestation. The authors administered surveys to the 243 Meiwan village residents on a household basis from May to August in 2003. Of the 52 households in the village, 45 completed and returned the questionnaires.

ENERGY SYSTEM UPGRADES

Meiwan village is located in the mountainous and largely undeveloped northwest part of Hainan. The village has a total land area of approximately 700 hectares and 100 hectares of ponds and rivers. The mountainous area of the village is covered by small-leaf eucalyptus, rubber, and fruit trees. The main agricultural products in the village are rubber, tropical fruits, and rice. All the households in the village raise pigs, buffalo, chicken, and ducks.

Under the guidance from the University of South China Tropical Agriculture, Hainan Agricultural Academy, and Danzhou Biogas Station, the leaders of Meiwan village have been pioneers in upgrading the household energy systems since 1992. These outside researchers also acted as technology advisors, introducing renewable energy technologies to local residents. The pace of technology diffusion in the village has accelerated since 2000 because of provincial subsidies under the CEV strategy. Under the CEV subsidies, the villagers in Meiwan were encouraged first to provide the labor and cover the costs themselves. They bought materials in the technical equipment market of a neighboring township and built new energy equipment under the guidance of the local research experts. Only after the research experts inspected and approved the project was financial compensation given. The survey revealed that 89 percent of Meiwan villagers received financial support from the government for the installation of anaerobic digesters. The compensation was based on economic need of villagers and ranged from 300 to 800 Yuan, with an average of 400 Yuan (one-third of the average total costs of installing an anaerobic digester).

Local economic conditions in Meiwan have improved as a result of utilizing renewable energy technologies and the development of sustainable forestry. The average annual family income increased from 11,367 Yuan in 1990 to 32,933 Yuan in 2002. With the improving local economic conditions, 100

percent of the households had employed anaerobic digestion, 76 percent solar water heaters, and 78 percent photovoltaic cells by the summer of 2003. Insights from the survey on the use and success of these various technologies are discussed below.

Solar Water Heaters

The main use of the domestic solar water heaters in Meiwan village is for the early evening bath. Along with implementation of the CEV strategy, houses in the village have added inside plumbing for bathrooms. With the solar water heaters, bathing has become more accessible, hygienic, and efficient for the villagers. A middle-aged woman in the village stated,

Before solar water heaters were introduced in the village, bathing was very difficult for us. We used to go to the nearby lake to have a short bath once a week in the summer. When it was cold, we had to get firewood and warm a lot of water. Since it was difficult for us to store enough hot water to have a bath, we normally had a bath every two weeks in winter...[T]he heater provides a great savings in firewood and water resources (Interview, 2003).

In 2003, about 34 households or 64 percent of all households were using solar water heaters. Among the 45 respondent families interviewed, 29 of them installed the solar water heaters at a cost of several hundred Yuan. The diffusion rate of domestic solar water heaters usage is set to increase within the next two years, as 43 of the 45 respondent families confirmed they would continue using the domestic solar water heaters or consider installing the equipment in their houses.

Solar Photovoltaic Application

As an experimental CEV project of promoting eco-construction on Hainan Island, the provincial government funded a supply of solar photovoltaic cells to the village of Meiwan. By the summer of 2003, 35 of the 45 respondent families had installed the photovoltaic cells, which although subsidized still cost each household 200 to 300 Yuan. Each cell is two square meters and can generate enough power to run small electronic devices that require less than eighty watts (e.g., electronic fans, bulbs, and tape players). The power can provide the electrical needs of a family for up to seven days after one sunny day, provided they use storage devices such as lead-acid batteries.

SPOTLIGHT ON NGO ACTIVISM IN CHINA

Green Eyes: Taking Action to Halt Illegal Wildlife Trade

By Daniela Salaverry, Pacific Environment

Growing up in a rural town in Zhejiang Province, Fang Minghe developed a compassion for animals at a young age; as an only child, they were his playmates. During a middle school trip to Guangdong, Fang was deeply disturbed when he came across photos documenting the cruelties of animal poaching. These photos motivated Fang to take action. Upon returning home to Changnan county of Wenzhou (a major business city on Zhejiang's coast), he shared his concerns with his classmates, and several supported his idea to develop a small club committed to animal welfare.

In 2000, while still in high school, Fang Minghe registered his informal club Green Eyes as an NGO. Over a few years his small club evolved into a professional and well-respected organization with three full-time staff, five offices, and hundreds of volunteers. To expand their activities, Fang set up and registered Green Eyes in three separate cities/counties (Wenzhou and Changnan in Zhejiang and Fuding in Fujian). Green Eyes activities include: (1) environmental education and outreach programs, (2) an animal clinic, and (3) a campaign to stop illegal wildlife trading. Besides receiving three grants from Global Greengrants Fund, Green Eyes receives modest support from local governmental agencies and Green Eyes' members.

Environmental Education. Throughout Wenzhou a team of volunteers give lectures and organize games with middle- and high-school students to increase awareness of environmental conservation. Green Eyes also conducts summer camp programs, offering students field trips with unique hands-on experience, such as releasing rehabilitated animals back into natural habitats or investigating water pollution in local towns.

Environmental Outreach. Green Eyes also works closely with the Wenzhou Green Student Forum, an alliance of university-based student green groups. Together, they have established a youth council that acts as a forum for management training, information exchange, and resource sharing among student green groups. Green Eyes has a comprehensive

website and monthly print publication, which keep members and the general public abreast of the NGO's activities and provides additional educational information.

Animal Rehabilitation Center. Green Eyes built an animal rehabilitation center in Wenzhou. The clinic is modest, consisting of four cages, with all medical services provided by self-taught volunteer veterinarians. They take in any injured wild animals, and often get calls about wild birds caught in illegal nets.

Wildlife Trade. Green Eyes plays an important role combating the illegal wildlife trade in Wenzhou. This trade has become a major black-market industry throughout China, where many species are in demand for pets, food, and traditional Chinese medicine. Working with local law enforcement to target vendors illegally selling endangered species, Green Eyes carries out undercover investigations and raids at many markets in Wenzhou. Volunteers are regularly involved in seizing wildlife that is illegally for sale and documenting transactions with hidden video cameras. In doing so, they put themselves at risk; they have been threatened and gotten into scuffles with angry vendors. In 2006, Fang Minghe will act as a key witness in a court case against a vendor who was illegally selling snakes and turtles. Their wildlife trade activities garner regular news media attention, which helps increase general public awareness, and puts more pressure on black-market vendors.

After 6 years of work, Fang still possesses the enthusiasm with which he started Green Eyes: "I hope that one day, Green Eyes can be part of a global youth environmental movement. Until then, I hope that Green Eyes will mature into a major NGO for civil society and environmental protection in China."

For more information on Green Eyes, please visit <http://www.greeneyeschina.org>. To learn about other Chinese NGO partners working with Pacific Environment please visit: www.pacificenvironment.org.

Biogas Utilization

The typical volume of a household anaerobic digester in Meiwan is 6 cubic meters; average construction costs are 1,258 Yuan. The biogas system in use in Meiwan can turn organic wastes into clean biogas by anaerobic processes. Besides being able to use readily available organic wastes, the residue can be composted and later applied directly to agricultural farmlands to produce commercial products. More than 10 years experience of utilizing biogas in Meiwan village indicates that with four or five people and a number of livestock, enough biogas can be generated to meet the cooking energy needs of the households. The provincial government has selected Meiwan's biogas and ecological agriculture program as an eco-village development prototype for Hainan.

POSITIVE IMPACTS

Compared with traditional wood burning for fuel that exacerbated deforestation, the upgraded energy systems in Meiwan provide a number of economic and health benefits to the village:

- Forest resources in the village are now well preserved; forest coverage has reached a high of 85 percent in 2006 up from 34.4 percent in 1988.
- Solar-based technologies have replaced the inefficient traditional energy sources and reduced the costly dependence on external commercial and non-commercial energy sources. Liquefied gas and coal are now simply complementary energy sources.
- Sanitation conditions have greatly improved, mainly as a result of the collection of organic waste for the biogas. Moreover, the biogas slurry acts as a natural fertilizer and helps to retain the nutrients in the soil.
- Utilization of clean energy has reduced people's exposure to indoor air pollution, preventing respiratory problems.

POLICY IMPLICATIONS

Given the urgent need to stop deforestation and the importance of upgrading energy systems in rural Hainan, the current programs introducing and diffusing small-scale renewable energy technologies could be strengthened even more. Drawing on the

survey results from Meiwan we have identified several policy recommendations that could address some gaps in the current CEV program.

- *Engaging village leaders.* The government should adopt a "farmer to farmer" extension strategy and make special efforts to teach and train the village leaders as extensionists of small-scale energy technologies. Once the leaders understand and accept the technologies, they can teach local residents so as to create a community-based multiplier effect.
- *Expanding role of research centers.* Local research institutions should expand their current evaluative role and become responsible for providing more ongoing technical support and training. For example, frequent technological introduction seminars and on-site instruction should be provided not only to expand adoption, but also to help train villagers on how to repair their equipment. Thus, farmers can learn from each other and the technology can be transferred or duplicated elsewhere more easily.
- *Establishing local extension offices.* A number of extension offices should be established to serve clusters of village and to facilitate technology diffusion. These offices should be responsible for the implementation of governmental renewable energy strategies and regulations, as well as provide necessary technical support and budget assistance to the villages for ongoing clean energy projects.
- *Expanding subsidy structure.* The current cost-share subsidies to villagers are very effective and should be maintained. The provincial government could put a premium on new economic activities that use renewable energy technologies. As for rural people who regard the up-front costs of the renewable energy systems as too expensive, a finance leasing program could be effective to clear the financing barriers for the rural people. In this program, the end users of renewable energy systems lease rather than purchase the units. Such financing programs could facilitate the creation and better management of even larger renewable energy projects. This approach does require that the government mediate agreements between the end users and leasing companies, in order to prevent heavy economic burden

on rural citizens and to maintain certain profits for the leasing companies.

CONCLUSIONS

The upgrade of the energy systems in Meiwan has provided clean and safe energy to satisfy the basic needs of life, conserved the rural environment and natural resources, and improved the rural agro-industrial structures, thereby meeting the Eco-Province goals. Hainan's model is one that could be utilized in other rural areas of China and beyond to help promote sustainable development and break destructive energy consumption patterns. Burning less wood and coal in China's vast rural areas also has major environmental and health benefits, both locally and globally. Moreover, the adoption and diffusion of small-scale renewable energy systems could encourage the growth of the clean energy market as well as renewable energy financing business in China. With major equipment made in China, producing renewable energy systems has become a new economic growth point. Notably, China's richest businessman—Zhengrong Shi—made his fortune in his solar energy company Suntech Power. This expanding clean energy industry and locally-led financing programs to promote renewable energy in rural areas could generate thousands of employment opportunities in China and also help make the country a major producer of renewable energy systems for the world.

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REFERENCES

- Dincer, I. (2000). "Renewable energy and sustainable development: A crucial review." *Renewable and Sustainable Energy Reviews*, 4, 157-175.
- Hainan Civilization-Ecology Office. (2002). *The construction plan of civilized and ecological villages in Hainan*. Haikou: The Chinese Communist Party Committee of Hainan Province.
- Hainan Department of Land, Environment and Resources. (1999). *Proposal for the creation of an eco-province in Hainan*. Haikou: Hainan Provincial Government.
- Han, W. J. (1997). "The tropical ecological agriculture mode and the developing foreground of Hainan." *Tropical Forestry*, 25(3), 126-129.
- He, J. (2001). "Impact of WTO accession on Chinese special economic zones." *Phoenix Weekly*, 39.
- He, Q.; Jing, W. Y.; & Wang, Y. T. (1992). *Introduction of environmental studies*. Beijing: Tsinghua University Press.
- Zhao, L.; Lin, Y.; Liu, S. Z.; & Lin, H. F. (1999). *The research report on the agricultural resources use and sustainable development in Hainan*. Haikou: Chinese Communist Party School of Hainan Provincial Committee.

INTRODUCTION

The Navigating Peace Initiative's Water Conflict Resolution in the United States and China Special Report

Jennifer L. Turner and Timothy Hildebrandt

Water conflicts have increased in number and severity throughout China over the past 25 years in the wake of burgeoning water demand, inefficient use of existing resources, and increasing levels of water pollution. The Western press has frequently reported on conflicts over large-scale water projects in China—the Three Gorges Dam and the massive south-north water transfer project. The Western press has frequently reported on conflicts over large-scale water projects in China—the Three Gorges Dam and the massive south-north water transfer project. Less public but equally, if not more threatening, to human and ecological health are the growing inter- and intra-provincial water conflicts over pollution and smaller dams.

The United States also faces growing water conflicts, such as disputes over the damming of the Colorado and Columbia rivers, the intergovernmental and interagency conflicts stemming from the project to restore the Florida Everglades and Missouri River, and the unsustainable draw downs of rivers, lakes, and groundwater aquifers to quench the thirst of growing southwestern cities. In addition to water quantity disputes, cities, farms, industries, and land developers increasingly clash with the U.S. Environmental Protection Agency over limits to water use as part of enforcing the Endangered Species Act and tougher water quality standards.

Both governmental and nongovernmental sectors in the United States and China are experimenting with institutions, regulations, and other mechanisms to solve the expanding water disputes. Ultimately, both countries need to develop stronger water conflict resolution institutions that produce: (1) faster resolution of water conflicts; (2) more creative, satisfying and enduring solutions; (3) reduced



Water Conflict Resolution Working Group and CEF staff on the campus of Beijing University. © Mike Eng

transaction costs; (4) improved working relationships among public, private and citizen stakeholders to deal with water disputes; and (5) increased stakeholder involvement in decision-making for water development and protection, which ultimately could help prevent conflicts from erupting.

In recognition of these common water challenges, in 2002 the Environmental Change and Security Program's (ECSP) Navigating Peace Initiative—supported by the Carnegie Corporation of New York—created the U.S.-China Water Conflict Resolution Working Group. This water working group was made up of eight individuals (four from

each country) and over the course of 18 months they met with government agencies, legal experts, non-governmental organizations (NGOs), and researchers in Tucson (Arizona), Beijing, and Washington, DC who specialize in water and natural resource conflict issues to explore water disputes and resolution strategies.

The U.S.-China Water Conflict Resolution Working Group's research presented in this special report not only describes similar water challenges in the two countries, but also demonstrates how water conflict resolution might prove to be a promising area for environmental cooperation between the United States and China. For example, while the federal and state governments in the United States have considerable experience in dealing with water use and water rights disputes in arid regions, they increasingly face water quality conflicts stemming from agricultural runoff and population pressures. China has been dealing with severe water quality conflicts much longer and could offer important insights to their U.S. counterparts while benefiting from American expertise in mediation and integrated water basin management. In pairs, the group produced four research papers:

- 1) Mike Eng (U.S. Institute for Environmental Conflict Resolution) and Ma Jun (Institute for Public and Environmental Affairs) examine the trends in the United States and China to adopt more collaborative approaches to solving water disputes, as well as present the kinds of tools, incentives, and capacity building needed to promote more lasting solutions to water disputes.

- 2) S. Elizabeth Birnbaum (American Rivers) and Xiubo Yu (Institute of Geographic Sciences and Natural Resource Research) focus on how NGOs in the United States and China have been pushing for greater transparency and more citizen input into decision-making around dam construction, dam removal, and river restoration.

- 3) Irene Brooks (International Joint Commission) and Liu Hongxia (Yellow River Conservancy Commission) examine the potential of river basin commissions as a mechanism for water conflict prevention and resolution. They not only examine two U.S. commissions (Delaware and Susquehanna) and the Yellow River Conservancy Commission, but also speculate on lessons offered by the International Joint Commission, which has proven to be a strong mechanism for cooperation and conflict prevention between Canada and the United States.

- 4) Wang Xuejun (Beijing University) and Jay Stein (Stein & Brockmann) compare inter-basin transfers as a water conflict resolution mechanism in the China and the United States, focusing on the Yellow River/ Hai Basin transfers and the San Juan/ Chama Project.

The first three papers are published in their entirety below, while the fourth paper on inter-basin transfers is summarized since it is to be published elsewhere. Research assistants in the China Environment Forum and ECSP also produced a short overview of transboundary water challenges facing China for this report.

SPECIAL REPORT

Building Sustainable Solutions to Water Conflicts in the United States and China

By Michael Eng and Ma Jun

In the Missouri River Basin, 9 federal agencies, 8 states, 28 Native American tribes, as well as numerous municipal governments, representatives of a wide range of stakeholders, and nongovernmental organizations (NGOs) are preparing to sit down together to begin crafting collaborative solutions for managing the longest river in the United States. This collaborative process aims to reestablish a healthy, self-sustaining ecosystem for three threatened and endangered bird and fish species, while continuing to also meet the multiple needs of river users and basin residents.

In the state of Florida, a 28-person Advisory Team composed of stakeholder representatives for local residents, recreation interests, the environment, and agriculture, along with representatives of federal, state, local, and tribal entities, has been working together since 2003, to provide informed consensus-based recommendations to an interagency technical project development team. The interagency team is developing a mutually agreed upon plan for the operation of two critical Everglades restoration projects: (1) to restore natural water flows to Everglades National Park and protect endangered species reliant on its ecosystem; and (2) to sustain coastal ecosystems and protect them from polluted stormwater runoff, while also providing flood protection for adjacent agricultural and urban areas.

In the western United States, a Platte River Governance Committee was established in 1997, with representation from three states, water users, environmental groups, and federal agencies, to jointly pursue a basin-wide effort to improve and maintain Platte River habitats for four threatened and endangered bird and fish species. In early 2005, the committee completed development of a comprehensive

Platte River Recovery Implementation Program, which is currently being considered for formal approval and adoption by the state governors.

In recent years, such anecdotes have come to represent more the rule than the exception; government entities and stakeholders in the United States are increasingly turning away from a primary focus on litigation strategies for protecting their interests, to instead devote their efforts on collaboratively addressing the challenges of meeting the multiple competing needs of water uses. Interestingly, China, which also faces increasingly contentious water conflicts, has begun to explore new options for preventing and resolving such disputes. Many new strategies involve greater centralization of decision-making over watersheds. (See Box 1).

As China is trying hard to build a market economy, the country is experimenting with the use of market forces to resolve water conflicts. At the same time, there is a growing recognition that using a market-based approach without also ensuring transparency and providing for public participation is neither an efficient nor effective way to resolve water conflicts. Thus, there are several government and nongovernmental initiatives in China promoting increased stakeholder involvement in the environmental policy sphere, which potentially provide a foundation for collaborative problem solving to prevent or resolve conflicts around water. (See Box 2). These policy pronouncements, along with the new legal requirements for more participatory environmental decision-making have resulted in a number of high profile cases in which stakeholders have emerged to vigorously advocate for the protection of their interests.

We first begin this paper with a discussion of the newly emerging collaborative approach to

BOX 1. Centralization Trends in Water Management in China—Tools for Conflict Resolution

- *Clarifying the authority of higher-level agencies to settle water conflicts.* While the original 1988 Water Law and the 1996 Water Pollution Prevention and Control Law gave central government agencies (i.e., the Ministry of Water Resources and its seven major river basin commissions) the power to “settle” or “coordinate” the solution of water disputes, the 2003 Water Law empowers these agencies to now also make final rulings over such disputes.
- *Strengthening the role of the central government in trans-province environmental law enforcement and in coordinating trans-province pollution conflict resolution.* The State Council’s February 2006 *Decision to Implement Scientific Way of Development and to Strengthen Environmental Protection* stated that the upstream provincial government is liable for compensation of losses caused by trans-province pollution, and the relevant governmental units and individuals shall be held responsible as well.
- *Establishing water affairs bureaus at the local level.* These bureaus integrate the water management functions of water supply, discharge and sewage treatment and have been established in the cities of Shanghai, Shenzhen, Beijing, and Hainan Province.
- *Strengthening river basin commissions.* The seven main river basin commissions and others established on the sub-watershed level are being granted more authority to conduct water regulation and allocation.

environmental problem solving in the United States, highlighting important tools for implementing collaboration. Second, we illustrate collaborative approaches to solving water management conflicts using the three U.S. cases mentioned above. The case studies give context for the following section that identifies the key institutional and legal incentives and disincentives in the United States that have encouraged this shift towards the use of collaborative approaches. Third, we explore the trends in China to resolve the growing contentious water disputes, examining possibilities to build the capacity and institutions to pursue more collaborative water conflict resolution strategies. Finally, we conclude by discussing the opportunities in both countries for creating additional incentives to pursue solutions collaboratively and the need to continue building capacity for effective collaboration strategies to solve costly water conflicts.

COLLABORATIVE APPROACHES TO ENVIRONMENTAL PROBLEM SOLVING IN THE UNITED STATES

During the last decade, government entities, private stakeholders, and NGOs in the United States have

increasingly been pursuing collaborative approaches to environmental problem solving, in general, and in water management challenges, in particular. Collaboration is a distinctly different approach to problem solving than litigation, which has traditionally been the favored approach to conflict resolution in the United States.

Collaboration generally means, “working together to achieve a shared goal.” Effective collaboration helps ensure the involvement of a more diverse range of perspectives than with traditional top-down unilateral government agency decision-making processes. The increased creativity and problem-solving capabilities unleashed through collaborative processes are particularly well suited for addressing complex environmental issues. The emphasis of collaborative approaches on engaging all potentially affected interests, including disadvantaged or underrepresented communities and those who care deeply about the issues being addressed, promotes stakeholder buy-in and public support for the eventual solution that is developed, while decreasing the likelihood of litigation. The process also helps develop shared responsibility and accountability for the implementation of negotiated solutions.

BOX 2. Legal Changes Promoting Greater Stakeholder Involvement in Water Management

- The State Council's 2004 *Guidelines on the Comprehensive Implementation of Administration By Law* stressed the importance of promoting the transparency of government information and of making administrative decisions according to the law. The guidelines provided the policy basis for a more transparent and participatory decision-making process. Various government agencies have been ordered to revise their rules and regulations to comply with the principles set forth in the guidelines.
- The 2004 Administrative License Law gives stakeholders affected by some administrative decision the right to access information from the government regarding the decision and the right to demand a hearing.
- The 2003 Environmental Impact Assessment (EIA) Law clearly states, "The nation encourages relevant units, experts and the public to participate in the EIA process in appropriate ways." This requirement for all construction projects to go through EIA process provides a legal basis for stakeholder involvement in any new controversial water projects.
- On 10 August 2004, the State Environmental Protection Administration (SEPA) issued the *Temporary Measures for Environmental Protection Administration Permission*, which states that public hearings should be conducted for two categories of construction projects and ten categories of project planning. The two categories of construction projects include large and medium construction projects that may cause serious environmental impacts and therefore require an EIA report.
- On 18 March 2006, the *Provisional Measures on Public Participation* in the EIA process became effective. The measures established detailed requirements on environmental information disclosure of proposed projects, including water projects that may lead to conflict.

The sharing of resources and technical expertise among participating agencies is another advantage of collaboration, allowing for more efficient use of available assets. Parties working together collaboratively to address an environmental problem can identify relevant available information early in the analytical process and resolve differences in assumptions or interpretations as they arise. Pursuing collaborative approaches also encourages integrating, coordinating, and streamlining the multiple reviews and analyses associated with different legal and permitting requirements. Furthermore, collaboration can help improve mutual understanding between participating government agencies and among stakeholders regarding each agency's different missions, policy mandates, and legal requirements, as well as their resource constraints and capabilities.

TOOLS FOR IMPLEMENTING COLLABORATIVE ENVIRONMENTAL PROBLEM SOLVING

A number of important tools are frequently used when implementing a collaborative approach to environmental problem solving—independent institutional conveners, third party mediators, information sharing, collaborative learning, adaptive management, and collaborative skills building. Collaboration tools continue to evolve in response to new applications tailored for different situations, each having a unique combination of participants, history, dynamics, and constraints.

Independent Institutional Conveners and Forum Neutrality

Because all the entities involved in water management conflicts have a direct stake in the outcome, an independent institution is often required to bring

the parties together and provide a neutral forum for collaborative problem solving. The use of an independent institution helps ensure the overall integrity and impartiality of the process. Without the availability of a trusted independent institution, parties in conflict may not be able to proceed productively with collaborative problem solving. The U.S.

Institute for Environmental Conflict Resolution (see Box 3) is a recently established independent federal agency that has been able to serve this need. Two of the three cases described later in this paper, relied on the Institute to play this important role in helping to convene the problem-solving efforts and ensure the neutrality of the process.

BOX 3. U.S. Institute for Environmental Conflict Resolution

The U.S. Institute for Environmental Conflict Resolution was created by the 1998 Environmental Policy and Conflict Resolution Act (Public Law 105-156). Its mission is to assist all parties in resolving environmental conflicts involving federal agencies. The Institute provides a neutral place inside the federal government where public and private interests can reach common ground. Its primary objectives are to: (1) resolve federal environmental, natural resources, and public lands disputes through assisted negotiation and mediation; (2) increase the appropriate use of environmental conflict resolution and improve the ability of federal agencies to use the approach effectively; and (3) promote collaborative problem solving and consensus building in federal environmental policy design and implementation. For additional information about the U.S. Institute for Environmental Conflict Resolution see: www.ecr.gov.

Third Party Mediators

The use of independent third party neutral mediators or facilitators for designing, convening, and managing the resolution process is a characteristic feature of successful efforts to address environmental problem solving collaboratively. In the United States today, most environmental issues, and especially water-related disputes, are highly contentious and frequently very polarizing. Public trust in governmental institutions is considered to be at an all-time low. Resentment towards the federal government, especially those federal agencies with natural resource management and environmental protection responsibilities, runs high particularly among some segments of the population and in certain areas of the country. Mistrust between agencies is also common.

Although collaboration *per se* does not necessitate the use of independent mediators, they are likely to be required in situations of low trust typical of major environmental conflicts. Use of an independent mediator, accountable to all the participants, who has no decision-making authority and no stake in the substantive outcome of the process, can help build confidence in the fairness and integrity of the process, while also improving communication among participants. Professional practitioners

of environmental mediation, in addition to having conflict resolution expertise, also are typically familiar with organizational missions and cultures of the participating agencies and with government decision-making procedures and requirements.

As the field of environmental and public policy mediation has developed, professional practitioner associations have articulated recommended “best practices”¹ regarding how to conduct collaborative processes. Combining conflict resolution theory with lessons learned from 25 years of case experience, these “best practices” provide practical guidance to government agencies considering collaborative agreement approaches to environmental problem solving. By following these “best practices,” agencies can enhance the likelihood that collaborative efforts will successfully result in agreed upon implementable solutions.² More recently, Policy Consensus Initiative, an NGO dedicated to building the collaborative problem-solving capacity of states, has formulated “Public Solutions: A System for Collaborative Governance.”³

Information Sharing

Another consistent feature of collaborative approaches to environmental problem solving is the necessity to share available information and to learn

together. A number of tools are utilized to address these needs. Developing a common Geographic Information Systems (GIS) database for a project provides a convenient means of sharing and analyzing information together. Furthermore, the negotiation of information sharing protocols and jointly designing the database framework helps build mutual trust, more effective working relationships, a foundation of procedural agreements, and a sense of teamwork and shared purpose. GIS can also be integrated with Decision Support System tools that incorporate explicitly articulated best professional judgments in conducting analyses of geographic-based alternatives, such as determining the most appropriate locations for habitat restoration projects.

Collaborative Learning

Collaborative problem solving also requires collaborative learning. Oftentimes participants have inadequate knowledge to develop informed solutions. In these circumstances, they can choose to jointly commission and select a team to conduct a “comprehensive study”⁴ to gather all available information and make it commonly available, while at the same time creating a shared baseline of knowledge and understanding. If certain critical factual information is contested, participants can engage in a joint fact-finding effort whereby they work together to articulate the questions that need to be answered, gather relevant data, analyze information, and clarify assumptions before deliberating on solutions.

Jointly developing analytical models is also a characteristic of successful collaborative problem solving. With water management conflicts these might include a wide range of potential modeling efforts, such as: predictive hydrologic models, historical hydrologic models, hydropower demand models, electric cost analysis models, water supply models, ground water models, flood prediction models, a variety of biological and aquatic ecosystem response models, and simulation models to predict impacts on different interests. Developing models collaboratively has many benefits. It requires developing a shared articulation of assumptions and provides a forum for shared thinking about key variables and their interactions. By developing models together and then jointly analyzing the results, collaborating parties avoid the kinds of disputes over the validity of interpretations that commonly occur with unilateral or proprietary modeling efforts. Instead of arguing over the validity or meaning of

the data, parties can focus on crafting and evaluating potential integrative solutions for addressing their multiple needs.

Adaptive Management

Adaptive management, which is a formal and systematic approach to learning from the outcomes of management actions and applying that learning to future management decisions, is another highly useful approach that is frequently used when addressing environmental problems collaboratively. Because of their complexity and our incomplete understanding of natural systems’ dynamic responses to anthropogenic manipulations, the development of conclusive solutions to water management conflicts is often constrained by high levels of scientific uncertainty. Such uncertainties create the need for assurances on the part of participants that management decisions are not necessarily final if they do not result in the anticipated outcomes. With an adaptive management approach, management actions are treated as experiments rather than as final solutions. Through collaborative monitoring and evaluation, information is generated to guide future adjustments to management actions based on ecosystem responses and desired outcomes, as well as to ensure early identification of unintended and undesirable impacts.

Collaboration Skills

Another important feature of successful approaches to collaborative environmental problem solving is providing participants with opportunities to build their collaboration skills. Through shared training and integrating learning exercises into deliberations, participants can improve their communication skills, along with their effectiveness in negotiating and joint problem solving. Very few scientists, technical staff, or stakeholder representatives have been previously exposed to collaboration skills development. And yet, such skills are essential in working through difficult issues to craft joint solutions with others who have strongly held different points of view.

CASE STUDIES OF COLLABORATIVE WATER MANAGEMENT EFFORTS

During the last decade in the United States, many of the major water disputes have involved conflicts between meeting the various domestic, municipal, and economic needs of different states, while also addressing federal requirements to protect

threatened and endangered species and maintain the critical habitat and riparian ecosystems upon which they depend. Balancing these oftentimes competing needs has become particularly challenging during the current prolonged drought affecting significant portions of the country.

The following three case studies, which focus on water management rather than “water rights,”⁵ help illustrate many of the characteristics and tools associated with a collaborative approach to addressing water management and endangered species challenges.

CASE 1: Missouri River Recovery Implementation Program

The U.S. Army Corps of Engineers (the Corps) operates six large dams and reservoirs on the Missouri River which together constitute the largest water storage system in the United States, with a capacity of 73 million acre feet.⁶ The mid-1940s enabling legislation for these structures authorized



Barge on the Missouri River. © Missouri Attorney General's Office

them to be operated for the purposes of flood control, navigation, irrigation, hydropower, water supply, water quality, recreation, and fish and wildlife. More than 500,000 acres of cropland have been developed for irrigation. Hydropower plants have a combined generation capacity of 10.9 billion kilowatt hours. It is estimated that more than \$3 billion in potential flood damages have been avoided. Up to 3 million tons per year of bulk cargo has been transported by barge on the river as a result of controlled water flows.

While many of the intended benefits have been accomplished, these water management structures and their operations have also fundamentally changed the pre-dam yearly cycles of water flow. Currently, 35 percent of the main stem of the Missouri River is impounded and 32 percent has been channelized. The altered flow regime has significantly impacted the Missouri River ecosystem. Two bird species dependent on the river's habitat are listed as endangered, and 51 of the river's 67 native fish species are listed as rare, uncommon, or decreasing in numbers—one is formally listed as an endangered species.⁷

Similar to resettlement challenges in China, the dams on the Missouri River also have had significant social consequences. Thousands of Native American Indians living on reservations in the basin were displaced and relocated to less habitable areas that were often more arid and less fertile than their home sites along the river's floodplain. Some tribes lost many thousands of acres of their reservation land to inundation. Important sacred sites to Native Americans were flooded, including ancestral burial grounds. These displacements and loss of lands have had powerful social and psychological impacts on tribes in the basin that continue to have ramifications today.

To help provide guidance in operating the dams according to an established schedule of water withdrawals to meet multiple competing needs, the Corps created the *Missouri River Master Operating Manual (Master Manual)* in the 1960s. However, in the late 1980s, in response to the first major drought in the basin since the reservoir system became operational, the provisions in the *Master Manual* came under intense public scrutiny and political pressures. In response, the Corps began an effort to revise the *Master Manual* to address the contemporary needs of the basin. However, due to prolonged litigation and ongoing disputes among various stakeholder interests, it took the Corps 16 years to finally complete the revision of the *Master Manual*. By this time, however, the Corps was required to also comply with the Endangered Species Act (ESA), which became law in 1973.

The U.S. Fish and Wildlife Service (FWS), charged with enforcing the ESA through formal consultation procedures in the case of proposed actions by other federal agencies, placed certain

requirements on the Corps and constraints on its operation of the Missouri River dams, in order to avoid jeopardizing the continued existence of the two species of birds (piping plover and least tern) and one fish (pallid sturgeon) in the basin that are formally listed as threatened or endangered. In making its final decision adopting the revised *Master Manual*, the Corps committed to take a number of actions to address endangered species concerns, including: flow enhancements, habitat restoration, monitoring and evaluation, adaptive management, and population propagation. Furthermore, the Corps agreed to develop a comprehensive Missouri River Recovery Implementation Program⁸ and to establish a broadly representative advisory committee composed of federal, state, and tribal entities, along with representatives of the full range of stakeholder interests in the basin, to serve as a forum for collaboration in implementing species recovery and ecosystem restoration actions. The Corps and FWS have now partnered with seven other federal agencies with programs in the basin to convene the Missouri River Recovery Implementation Committee. Because of the long history of conflict over water management issues in the basin and the challenge of bringing together competing interests to collaborate on ecosystem restoration, the U.S. Institute for Environmental Conflict Resolution, an independent federal agency, has been asked to assist by providing independent and impartial process design, facilitation, and mediation expertise.⁹

CASE 2: Everglades Ecosystem Restoration

In 2001, despite a broad consensus that had been building gradually among citizens, the state of Florida, and the federal government to restore the Everglades ecosystem,¹⁰ a vehement and still unresolved interagency conflict dating back to the 1960s over the implementation of two long-delayed water management projects was threatening to sabotage progress and momentum. One project was meant to provide flood protection to agricultural lands and to discharge floodwaters into adjacent coastal waters. The other project was meant to restore natural hydrologic conditions to Everglades National Park, whose habitat was being impacted by altered water flows due to upstream flood control measures.

The interagency conflict came to a head when the FWS, exercising its authority and responsibilities

under the Endangered Species Act (ESA), issued the Corps an advisory letter indicating that its planned annual operation of the Central and Southern Florida Water Project would result in jeopardizing the continued survival of an endangered bird, the Cape Sable seaside sparrow. The endangered sparrow's primary remaining habitat was located in Everglades National Park. The South Florida Water Management District, a state agency charged with conducting the day-to-day operations of the water management structures in accordance with the Corps' annual operating plan, was also implicated because it could potentially be held legally liable for violating the ESA. Around the same time, the Council on Environmental Quality¹¹ (CEQ), which coordinates federal environmental policy on



Non-point pollution from agriculture has become a major source of water degradation within the Everglades. © South Florida Water Management District

behalf of the President and which is responsible for overseeing federal agencies' compliance with the National Environmental Policy Act (NEPA), advised the Corps that it could no longer continue to indefinitely operate the Central and Southern Florida Water Project on an experimental basis, as it had since 1983, to determine how to restore flows to Everglades National Park. CEQ gave the Corps a deadline to complete an Environmental Impact Statement (EIS), as stipulated by NEPA.

It became clear that none of the agencies could act unilaterally to solely pursue its own objectives, without also accommodating the needs and concerns of the other agencies, which also shared authority and jurisdiction over the issues that had to be resolved. Attempts were made by high-level

officials from the different agencies to negotiate a solution. The agency officials were stymied, however, because their technical staffs provided them with competing interpretations of the highly technical results of the hydrologic modeling. The officials had no dependable objective basis to use when evaluating the impacts of various alternatives for negotiating an acceptable compromise. On the recommendation of CEQ, the agencies requested impartial mediation assistance from the U.S. Institute for Environmental Conflict Resolution in an attempt to sufficiently resolve their differences to allow the projects to proceed.

Over a ten-month period, the four agencies succeeded in reaching agreement on an Interim Operating Plan for the Central and Southern Florida Water Project, which then became the “preferred alternative” in the formal NEPA review process. Because of the progress made in resolving long-standing issues and their improved working relations, as well as the shared recognition of their mutual interdependence, the four agencies agreed to undertake a collaborative NEPA process¹² to jointly develop a long-term solution that would address all the endangered species, flood protection, water flow, water quality, and funding issues. All of these issues needed to be resolved for the two water management projects to be implemented. With the assistance of a team of mediators working under the auspices of the U.S. Institute, these four agencies have gone on to engage other federal, tribal, state, and local government entities in jointly creating and improving analytic models, developing alternatives, analyzing their impacts, and negotiating a preferred alternative to recommend to the Corps, which is the final decision-making agency. In addition to this interagency team, an advisory body¹³ that included nongovernmental representatives of various stakeholder interests was also established to provide input and informed advice on draft proposals generated by the interagency team. In the fall of 2006, this effort is entering into the final stages of the NEPA process. The final decision is expected to enjoy widespread interagency and public support. The interagency team will continue to jointly monitor implementation using an adaptive management approach to ensure that adjustments are made to achieve the projects’ objectives.

CASE 3: Platte River Recovery Implementation Program

The Platte River originates from snowmelt in the Rocky Mountains in the western United States, and

flows through the states of Colorado, Wyoming, and Nebraska. Water projects in the basin store over 7.1 million acre-feet of water in 190 storage facilities, irrigating 1.9 million acres of farmland, generating power, and providing municipal water supplies and recreation. These water projects also have had impacts on the Platte River’s riparian ecosystem.

With the existence of four threatened or endangered species in the basin (the whooping crane, piping plover, least tern, and pallid sturgeon), concerns were raised in the 1990s about the continuing impacts of the water projects on the habitat of these species, as well as the likely prospect of regulatory requirements restricting the operating conditions of these water management projects in order to comply with the ESA. These concerns created strong incentives for water users, conservation groups, the three states, and the federal government to work together in seeking potential solutions for complying with the ESA, while also providing a level of certainty regarding long-term water availability for water users.

In 1997, after three years of discussion and negotiation, a Cooperative Agreement was signed by the governors of the states of Colorado, Wyoming, and Nebraska, and the Secretary of the Interior (who oversees the FWS and who is ultimately responsible for implementation of the ESA) indicating their joint commitment to establish a basin-wide endangered species recovery program for the Platte River. The proposed program would allow existing water projects to collectively comply with ESA requirements and avoid the need to fully consult with FWS on an individual project basis.¹⁴ The proposed program was also envisioned as a way to proactively avoid future listings of other endangered species and to ensure mitigation of potential impacts of any new water projects in the basin, without unduly affecting existing water users. The program would pursue an “adaptive management” approach to factor in new information as it was developed. Differences would be resolved through learning together from the successes and failures of experimental manipulations and implemented recovery actions. Outside independent scientists would peer review all scientific studies developed by the program.

The Cooperative Agreement established a Governance Committee composed of ten members that included representatives of two federal agencies, the three states, two conservation organizations, and three water users. Their role was to establish policies, review, direct, and develop the proposed Platte River Basin-wide Recovery Program. They

also hired an executive director to provide staffing support and help coordinate the functioning of the committee in developing the recovery program. The Governance Committee operates on a consensus basis. They have, on occasion, sought the assistance of a mutually selected independent mediator, to help them reach agreement on key policy issues.

It has taken the Governance Committee nine years of intense negotiations to formulate and reach agreement on a proposed Platte River Recovery Implementation Program. During the summer of 2006, the proposed Program underwent final formal public review and comment at the federal level under the provisions of NEPA. Each state also will be taking public comments and holding public hearings on the proposed program, before making their individual final approval decisions. If approved, as expected, the program would be formally initiated in October 2006.

INCENTIVES AND DISINCENTIVES FOR COLLABORATIVE PROBLEM SOLVING IN THE UNITED STATES

In the United States, the newly emerging collaborative approaches and tools for water conflict resolution reflect the incentives and disincentives created by a series of key environmental laws passed in the 1970s. These and later key laws, implementing regulations, executive orders, and policy directives are discussed below.

National Environmental Policy Act

Originally passed in 1969, the National Environmental Policy Act (NEPA)¹⁵ established and defined the fundamental environmental policy of the United States by declaring that the federal government is to create and maintain conditions under which humans and nature can exist in productive harmony. Its scope is far-reaching in requiring all federal agencies to identify, analyze, and thoughtfully consider the environmental impacts of any major proposed actions. NEPA also requires federal agencies to involve the public, provide for the public review of an environmental impact statement on proposed and alternative actions, and to solicit and respond to public concerns that are raised.

Since its passage and especially more recently, Council on Environmental Quality (CEQ), which oversees the implementation of NEPA, has encouraged federal agencies to utilize more collaborative approaches to complying with NEPA. Increased

emphasis has been given to engaging other federal agencies and governmental entities as cooperating agencies¹⁶ in preparing and documenting environmental impact analyses.¹⁷ CEQ has encouraged federal agencies to approach NEPA requirements as an opportunity and flexible procedural framework for intergovernmental collaboration and conflict resolution at both the programmatic policy and specific project levels.

Various interests who oppose the proposed actions of federal agencies frequently use the courts to challenge the administrative process followed by agencies in preparing environmental impact statements used in formulating their final decisions. Approximately 325 NEPA cases were adjudicated between January 2001 and June 2004.¹⁸ The time-consuming and costly court cases have served to create important incentives for all parties to pursue more collaborative approaches to conducting NEPA analyses. Federal agencies can potentially avoid lengthy delays in implementing proposed actions due to litigation; and other agencies, as well as interested or affected parties, can have a more significant role in influencing the substantive aspects of decisions made by the lead federal agency.

While collaborative NEPA processes can take more time up front to complete than traditional NEPA processes, the greater involvement of other governmental entities and nongovernmental stakeholders can build greater buy-in to the eventual decision, resulting in smoother implementation and a reduced likelihood of extended delays due to litigation or public opposition. In situations where multiple agencies share jurisdiction over an issue the use of collaborative approaches provides the opportunity to resolve interagency differences during the course of conducting NEPA analyses. This helps avoid major conflicts that can result when federal agencies make unilateral decisions.

Endangered Species Act

Originally passed in 1973, the Endangered Species Act (ESA) is one of the most comprehensive, powerful, and far-reaching of all the environmental laws in the United States.¹⁹ It applies wherever any species is threatened with extinction, whatever the source of that threat. Its enactment reflected a broad consensus at the time that existing federal laws were inadequate to preserve at-risk species. The law and its implementing regulations require all federal agencies to ensure that their actions do not jeopardize the continued existence of threatened or endangered species.

It prohibits all persons from killing or harming an endangered species, or significantly modifying its critical habitat. The law's implementing agency, the U.S. Fish and Wildlife Service (FWS) within the U.S. Department of the Interior, has significant authority to prevent or constrain federal actions, including state or local actions receiving federal funds or requiring federal permits, until concerns related to endangered species are adequately addressed.

A key provision in the law allows any citizen to petition FWS to formally designate a species as threatened or endangered. FWS must comply with statutory deadlines in responding to these citizen petitions. Decisions made by FWS can also be challenged through litigation. This ability to delay and alter proposed projects or actions by any interested or affected party results in considerable uncertainty for other federal agencies, as well as developers whose projects require federal permits. This uncertainty, in turn, creates significant motivation to pursue negotiated solutions. While highly prohibitive in its original version, the law and its implementing regulations have increasingly allowed for more flexibility in complying with its requirements. This is accomplished through a variety of mechanisms that allow and encourage the development of negotiated agreements between FWS and other federal agencies, states, private parties, and NGOs regarding how compliance with the Endangered Species Act will be accomplished.²⁰

Clean Water Act

The Clean Water Act, which was passed in its original form in 1972, is the primary federal law governing water pollution. Its goals are to eliminate releases of pollutants to waters in toxic amounts and to achieve water quality standards sufficient to allow for safe recreational swimming and fishing. The law requires a permit issued by the Corps to discharge dredge or fill materials into U.S. waters, including wetlands. This federal action also requires review by FWS in meeting its responsibilities under the ESA.

All discharges of pollutants directly into U.S. waters also require a permit, whose issuance is frequently delegated by the U.S. Environmental Protection Agency (EPA) to the environmental protection agencies of individual states. These National Pollutant Discharge Elimination System (NPDES) permits are subject to third-party legal challenges under the ESA if they threaten the continued existence of endangered species.

If states are unable to meet their water quality standards, they are required to take more drastic action by establishing Total Maximum Daily Loads (TMDL) of pollutants from all sources. These TMDLs must be approved by EPA, whose decision is also subject to review under the ESA. The development of TMDLs, because they implicate pollution from all sources in a watershed, has been approached collaboratively by some states. In these situations, all contributors of pollutants in a watershed and the public are engaged to negotiate and implement a joint solution developed by all the parties.

Administrative Procedure Act

Originally passed in 1946 during a period of significant expansion of federal agency authorities, the Administrative Procedure Act (APA) provides the fundamental legal basis for initiating most lawsuits by affected interests and NGOs that challenge the regulatory decisions made by federal agencies. For example, it is through the provisions of the APA that parties are able to challenge in federal court the adequacy of the way by which agencies have met the procedural requirements of NEPA and ESA. Without the Administrative Procedure Act, there would be no legal basis for challenging federal agency decisions. The provisions of the APA have served to create powerful disincentives for federal agencies to make unsubstantiated "arbitrary and capricious" decisions, at the same time creating incentives to seek collaborative solutions in order to avoid extensive delays in implementing actions due to litigation.

Negotiated Rulemaking Act

Negotiated rulemaking ("Reg-Neg") is a process in which a regulatory agency establishes an Advisory Committee composed of representatives from a broad range of interests to negotiate the terms of an administrative rule and propose it to the agency for consideration. If the Advisory Committee can reach consensus on a recommendation, the agency commits to publish it as its "proposed rule" and then follows the normal procedures for soliciting and evaluating public comments before issuing a "final rule."

Experimentation with the use of negotiated rulemaking began in the 1980s by the EPA and the Department of the Treasury in response to concerns that traditional rulemaking by federal agencies had become too adversarial, making subsequent enforcement problematic. Its use did not become

more widespread among other agencies, however, until the U.S. Congress passed the Negotiated Rulemaking Act in 1990, formally legalizing the approach. Agencies were encouraged to use a negotiated approach to rulemaking when appropriate. Negotiated rulemaking was not required but rather could be pursued at the discretion of the agency. An agency decision to use, or not use, negotiated rulemaking procedures was not subject to judicial review. The Negotiated Rulemaking Act was permanently reauthorized in 1996 and incorporated into the Administrative Procedure Act described above. Provisions of the act allow for the use of an independent convener and facilitator approved by the Advisory Committee to assist it in negotiating agreement on a recommended proposed rule.

Administrative Dispute Resolution Act (ADRA)

At the same time that the U.S. Congress permanently reauthorized the Negotiated Rulemaking Act, it also passed The Administrative Dispute Resolution Act (ADRA) of 1996. The ADRA requires all federal agencies to establish policies and internal capacity for using alternative dispute resolution (ADR) techniques as an alternative to litigation in the federal courts. The act was passed in response to the recognition that court-based resolution of disputes over a variety of administrative proceedings of federal agencies was becoming increasingly costly and time consuming, while at the same time reducing the likelihood for achieving consensual resolution of disputes because of its adversarial nature. Congress also recognized that oftentimes more creative, efficient, and sensible solutions could be achieved through alternative means than the court system. ADRA allowed federal agencies to use the services of a neutral mediator or facilitator selected by the participating parties to help them address disputes related to rulemakings, enforcement actions, issuing and revoking of licenses or permits, contracts, litigation against agencies, as well as other agency actions.²¹

Federal Advisory Committee Act

The Federal Advisory Committee Act (FACA), originally passed in 1972, governs the behavior of advisory committees to the federal government that include nongovernmental participants. FACA was an attempt by Congress to ensure transparency and balance of viewpoints when federal agencies solicited advice from outside entities in making their administrative decisions. Federal advisory committees must represent a balanced membership that is

thoroughly vetted before appointment through a public review process. Opportunities also are provided for the public to provide written or oral comments on the matters being considered. All meetings of advisory committees are open to the public and the public is provided access to all committee-generated informational materials. FACA does not apply to advisory bodies composed solely of other governmental participants, which could include representatives of other federal agencies and tribal, state, or local government entities. For example, an advisory group composed of cooperating agencies involved in a NEPA process, would not be subject to FACA, because only governmental entities can be designated as cooperating agencies. While certainly laudable in its intent, FACA requirements have become an impediment to collaboration in the view of many federal agencies due to the perceived administrative burdens and costs associated with establishing and maintaining a formally established advisory committee.

RECENT POLICY DIRECTIVES ON ENVIRONMENTAL COLLABORATIVE PROBLEM SOLVING

A number of more recent policy directives have continued to encourage the use of collaborative approaches to addressing environmental problems and resolving environmental disputes. Some of the more notable developments are highlighted below.

U.S. Institute for Environmental Conflict Resolution

The work of the U.S. Institute for Environmental Conflict Resolution (USIECR), introduced in Box 3, has gone well beyond assisting parties with collaborative problem solving. For example, in response to its NEPA-related mission, USIECR convened a National Environmental Conflict Resolution Advisory Committee²² that represented a balanced cross section of viewpoints concerning environmental issues and the field of environmental conflict resolution. The committee conducted numerous analyses including detailed case studies of NEPA projects, court rulings, and conflict resolution methodologies. The committee concluded that effective forms of environmental conflict resolution can produce agency decisions that manifest the national environmental policies embodied in NEPA and that NEPA's policies

and environmental conflict resolution techniques can serve as mutually reinforcing tools to help the federal government make more informed and sustainable decisions. The committee found a striking similarity between the policies set forth in NEPA and the principles and practices that characterize effective environmental conflict resolution.²³ In sum, the committee concluded that well-designed and executed environmental conflict resolution processes are capable of producing federal agency decisions that reflect NEPA's core principles.

Joint Memorandum on Environmental Conflict Resolution and Collaborative Problem Solving

In November 2005, the Office of Budget & Management and CEQ issued a joint memorandum to the heads of all federal agencies directing them to increase their effective use of environmental conflict resolution and to build their institutional capacity for collaborative problem solving.²⁴ The memorandum acknowledged the challenge of balancing competing public interests and federal agency responsibilities when striving to accomplish national environmental protection and management goals. It also recognized how unresolved environmental conflicts have resulted in: (1) protracted and costly environmental litigation; (2) unnecessarily lengthy project and resource planning processes; (3) costly delays in implementing needed environmental protection measures; (4) foregone public and private investments when court decisions are not timely or are appealed; (5) lower quality outcomes and lost opportunities when environmental plans and decisions are not informed by all available information and perspectives; and (6) deep-seated antagonism and hostility repeatedly reinforced between stakeholders and federal agencies. The memorandum also set forth basic principles for engaging federal agencies in environmental conflict resolution and collaborative problem solving. Furthermore, the memorandum encouraged federal agencies to consider assisted negotiations when addressing environmental conflicts and to draw upon the independent services of the USIECR and other internal and external alternative dispute resolutions programs.

Executive Order on Cooperative Conservation

In 2004, President Bush issued an executive order to the heads of the departments of the Interior, Agriculture, Commerce, and Defense and EPA to implement laws relating to the environment

and natural resources in a manner that promotes cooperative conservation, with an emphasis on appropriate inclusion of local participation in federal decision-making, in accordance with their respective agency missions, policies, and regulations.²⁵ The executive order defined "cooperative conservation" as actions that relate to the use, enhancement, and enjoyment of natural resources, protection of the environment and that involve collaborative activity among federal, state, local, and tribal governments, private for-profit and nonprofit institutions, other nongovernmental entities and individuals. Since its issuance, a number of administrative actions have been taken to implement the executive order, including the development of agencies' internal policies on hiring, training, and rewarding employees based on their collaboration skills. In addition, the President is preparing a package of legislation designed to achieve his administration's natural resource and environmental policy goals through a cooperative conservation approach.

National Park Service Director's Order 75A: Civic Engagement and Public Involvement

This internal policy directive to employees of the National Park Service (NPS) issued by its director in 2004 provides an example of how the broad federal policy of using more collaborative approaches is being implemented at the individual agency level.²⁶ The purpose of this director's order is to articulate the NPS's commitment to civic engagement, and to ensure that all units and offices embrace civic engagement as the essential foundation and framework for creating its plans and developing its programs. Civic engagement is viewed as a continuous, dynamic conversation with the public on many levels that helps reinforce the public's commitment to the preservation of national park resources.

Additional Incentives and Disincentives Created by American System of Governance

When any particular interest believes it has the ability to unilaterally achieve its objectives without having to consider the needs or interests of others, then little incentive exists to seek collaborative solutions. The American form of governance, which is based on a system of checks and balances among three co-equal branches of government and two main political parties, generally prevents any single particular interest from being able to garner sufficient power to make unilateral decisions.²⁷ The need to

build consensus to move forward on issues and to collaborate to solve common problems is a virtually necessity under the U.S. system. Other key components in the American system of governance that create the incentives and capacity for collaborative problem solving include the transparency of decision-making procedures, an assertive free press, public access to information, opportunities for public involvement, and an engaged citizenry.

THE CHINESE CHALLENGE OF WATER CONFLICT RESOLUTION

China faces similar water conflicts as the United States, as well as the same challenge of overlapping pollution control and natural resource protection laws that create conflicting missions among government agencies. Despite these similarities, China is handling its water conflicts in a much different way, reflective of a significantly different political system. So far, the government, especially the executive branch, still largely dominates water conflict resolution efforts. However, there are laws and institutions that are starting to form the foundation for more collaborative problem-solving mechanisms to resolve the country's increasingly severe water conflicts.

In China, government agencies have the responsibility to resolve interagency and inter-jurisdictional water conflicts. China's first Water Law, which took effect in 1988, stipulated that interregional water quantity disputes should be resolved through negotiation and/or "settled by the next higher level government agencies."

China's National Water Pollution Prevention and Control Law (adopted in 1984 and updated in 1996), stipulates that disputes over water pollution involving two or more administrative regions shall be settled through negotiation by the local governments concerned, or through coordination by their common superior government. These two laws provided the legal basis for the resolution of water quantity and quality conflicts to be dominated by the executive branch. The laws do not allow for judicial resolution of interregional water conflicts. However, a number of laws exist that enable Chinese citizens victimized by pollution to take industries to court.

In fact, the dominance of the executive branch in water conflict resolution has been steadily strengthened, at least on paper. While the original 1988 Water Law and the 1996 Water Pollution Prevention and Control Law gave superior government agencies the power to "settle" or "coordinate"

the solution of water disputes, the 2003 Water Law empowers the superior agencies to make final rulings over such disputes.

This strong trend of prioritizing top-down resolution of water conflicts is paralleled by another quieter trend of addressing water disputes through a more collaborative approach, reflected in increasing transparency and public participation. China's top environmental agency and domestic environmental groups have been the strongest advocates of this new trend. A key law enabling this push for openness is the country's first Environmental Impact Assessment (EIA) Law that requires EIAs on every construction project. This more transparent and participatory environmental assessment process could eventually reshape China's traditional way of addressing water conflict resolution.

Centralized Water Management System and Its Constraints

In China, many water officials and experts view the problems of the nation's water management system as a result of insufficient centralized regulation. Many believe that horizontal governance structures and redundancy of agencies at each level of government bring too many agencies—water resources, construction, environment, agricultural, land and resources, oceanography and transportation departments—into the business of water management, thus preventing efficient and effective resolution of water conflicts. Vertically, the governance structure perhaps gives provincial and sub-provincial governments excessive power over water management, thus undermining watershed-based management efforts.

Since late 1990s, the trend is towards strengthening centralized management both horizontally and vertically. Horizontally speaking, some local governments (e.g., Shanghai, Shenzhen, Hainan Province, and Beijing) have created water affairs bureaus, which integrate the water management functions of water supply, discharge and sewage treatment. Vertically speaking, river basin commissions on the watershed and sub-watershed level are being granted more authority to conduct water regulation and allocation, most notably with the new requirement to take ecological flows into account.

Using Centralized Power to Repair Drying Rivers

To its advocates, the biggest success of this more centralized management system is the resumption of perennial flow in the Yellow River. The Yellow River suffered its first dry-up in history in 1972,

SPOTLIGHT ON NGO ACTIVISM IN CHINA

Perspectives on the 4th NGO Forum for International Environmental Cooperation

By Kristen McDonald

As one who is easily bored by conferences, I found myself unusually motivated to attend as much as possible of the 4th NGO Forum for International Environmental Cooperation, which took place 7-12 November 2005 in Kunming. The forum provided a welcome break from field research, a chance to talk through initial findings, see old friends and make new ones, and hear campaign news and candid perspectives from new and veteran environmental leaders. Sponsored by the International Fund for China's Environment, Renmin University, Green Earth Volunteers, Kunming Institute of Science and Technology, and Green Watershed, the forum included two days of NGO development training and two days of presentations and discussion. Sessions focused on campaign strategies, biodiversity conservation, and water resource protection. Participants included students from over a dozen Chinese universities, representatives from various Chinese and international NGOs, as well as a handful of academics such as myself.

BLACK CATS, WHITE CATS

During the forum's training session, NGO leaders offered a wealth of advice aimed at breaking down the complexities of NGO work into easily digestible parts. Li Zhinan of the Center for Biological Diversity and Indigenous Knowledge opened the first day of the capacity building training with a presentation on the project cycle; Michele Perrault, from the Sierra Club, presented the Chinese language version of the Club's "Winning Victories for the Environment" training manual; Elaine Zuckerman of Gender Action introduced a nine-point program for creating an NGO; and Dorit Lehrick of the China Association for NGOs discussed three good governance principals in fundraising, "accountability, transparency, and legitimacy."

In the hands-on portion of the training, Professor Jie Zhao and Ms. Jie Qian of the Yunnan Academy of Social Sciences led participants through a strategic planning exercise, which began with brainstorming

participants' chief environmental concerns. Work groups were then formed around (intriguingly) the dominant interests of car emissions, college students' mental health, soil conservation, ecological conservation, water resource scarcity, environmental education, and protection of fish and bird species.

Many at the forum expressed concern with the level of cooperation within and among Chinese NGOs. Elaine Zuckerman stressed in her training that Chinese environmental advocates do not engage in enough teamwork to survive. Dr. Katherine Morton of Australian Northern University suggested that Chinese environmental NGOs (ENGOS) build partnerships with not just other ENGOS, but also poverty alleviation NGOs, corporations, and transboundary colleagues. I have often wondered what stands in the way of Chinese NGOs working more closely together. My impression is that in part, many ENGOS in China are still searching for an identity and position amidst an often bewildering array of shifting ground rules. Walking this balance beam arm in arm with another fledgling NGO is not necessarily more stable than walking it alone. One problem is the lack of models within China for the kind of specific tactics Chinese NGOs can safely and successfully employ to combine efforts. The forum provided NGOs with the opportunity to share experiences and develop a sense of collective identity—an important foundation for cooperation. Some attendees commented that one major benefit of the conference was that it provided a model they could learn from, to go out and run their own NGO trainings and workshops. I hope they do just that.

AN ANT CAN DESTROY A WHOLE DAM

Indeed, the kinds of successes Chinese environmental organizations are experiencing are unbelievable given the constraints and obstacles they face. Wu Dengming of Green Volunteers League of Chongqing reported on the group's success in making environmental education compulsory in

the municipality's elementary schools and an available option in its middle schools. Fan Liangzhen described Wuhan Green Environmental Protection Center's publication on environmentally friendly companies and its pioneering efforts to link river conservation with recreation by organizing a "Swimming Across the Yangtze" event. May Ng of Friends of the Earth Hong Kong discussed the Greenpeace China campaign to confront the illegal logging practices of Asian Paper and Pulp Corporation in Yunnan Province, which sparked a lawsuit as well as boycotts across China.

I eagerly ate up every word of the final day's presentations on freshwater resource issues, as they related most specifically to my own research on the Nu River Basin. Samuel Sage, IFCE vice president, started the session with a warning against water privatization, and moderator Liang Congjie provocatively noted that many watersheds in China are now monopolized by giant hydroelectric power companies; although this is not officially announced as privatization, it is actually privatization.

Kevin Li of International Rivers Network reported on his research into the potential downstream impacts of Mekong River dams in Yunnan. Zhu Hua of the Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences followed with a detailed and visually stunning presentation on the vegetation of the Mekong Valley in China. For an area that is so little understood and so rapidly changing, it was encouraging to hear that the institute is attempting to record the region's rich biological and ecological diversity. Regarding a query on the major environmental threats to his study region, Dr. Zhu noted that it was difficult to predict the ecological impact of the planned six hydropower plants, for no one, not even he, had done research on this development. Audience members pushed Dr. Zhu to be more specific, but I was already impressed that an Academy scientist would publicly admit to the lack of an adequate impact assessment on the Mekong dams. It served as testimony both to the limitations of China's Environmental Impact Assessment (EIA) Law and the potential to correct these limitations through public involvement.

Tong Huan Ji of Sichuan University's Environmental Protection Volunteer Association gave a fascinating report on the trials of the Three River Confluence Nature Reserve, designated in 2004 in a last-ditch effort to protect the Yangtze River's fish habitat. I was amazed to learn about what appeared to be the first riverine nature reserve

in China. Tong told of the conflict between the Xiaodu Dam and the nature reserve, which resulted in a decision to shrink the reserve boundaries to accommodate the dam. Tong noted, infrastructure for production purposes is not allowed in nature reserves. Thus, in order to build the dam, they redrew the boundary, and it was approved, a clear abuse of the EIA legislation. Adding that construction of the plant continued despite its appearance on SEPA's "dirty thirty" list last year.

IF YOU DON'T ENTER THE TIGER'S LAIR, YOU CANNOT CATCH ANY CUBS

In the closing panel, Yu Xiaogang, director of Green Watershed, gave his only address at the conference (translated by former WWF Director Jim Harkness, also the star of the previous evening's banquet sing-along). In recent months, Dr. Yu had been under intense pressure from authorities. Initially he was not allowed to present at the forum, despite all he did to help organize it. And yet, there he was, in the grandest conference room of a government hotel, congratulating his NGO comrades on their ability to learn from one another. Dr. Yu noted that among other accomplishments, the forum "added gas to our engines." His remarks served as a simple and poignant reminder of how China's ENGOs are leading the way in advancing environmental protection, and in boldly and sometimes riskily creating new spaces for citizens to participate in political processes. The student group representatives who attended should be lauded for making use of the networking opportunity to produce an inspirational statement on the need for and role of student environmental groups in China. The statement was delivered during the closing panel and made available for attendees to sign.

Organizing conferences to meet the needs of all attendees is always challenging, yet the organizers did a good job of distributing and collecting post-forum surveys, and Dr. Yu reported that a large majority were satisfied with the event. I certainly felt satisfied—I picked up some new information and research contacts, and made some new friends; my engine is still running, thank you!

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and the length of dry-up kept increasing until 1997 when the river was dry for 226 days. Since then, the government imposed a more centralized regulation to limit water allocations to the provinces to make sure that there is always a flow, no matter how limited, into the Yellow River estuary.

Another oft-cited story is on the Hei River Basin, the second largest (after the Tarim) inland river basin in China. Replenished by glaciers on the edge of Qinghai-Tibet Plateau, the Hei River used to flow into twin lakes in the center of the Gobi Desert in western Inner Mongolia near the ancient city of Etsina. The development of farming and industry in the middle reach of the river since the late 1950s has greatly reduced the water supply in the downstream region. In the 1970s, the lakes began to dry up and local Mongolian herdsman were severely impacted by the desertification. In the late 1990s, when more than 20,000 local Mongolians lost their source of drinking water and became “eco-refugees,” the Inner Mongolian government lodged a strongly worded petition to the central government.²⁸ This demand for help aroused the attention of the leadership, who ordered the drafting of a fairer water allocation plan and a special Hei River Commission was established to enforce it. Through centralized regulation, water flows have reached the previously dried twin lakes near Etsina for the past three years.

While in the United States a dissatisfied party can potentially hold up and prevent the implementation of certain kinds of executive branch decisions for many years through litigation, in China, the rulings made by the superior government agency are final. The marathon type of lawsuit over water disputes that occurs in America cannot happen in China. Thus, Chinese government agencies are able to settle water conflicts more quickly and efficiently, so as to prevent them from growing further out of control. This approach is viewed as a crucial tool to maintain social stability. Such a top-down approach has enabled China to address highly contentious water situations much more quickly—most notably is the South to North Water Diversion Project.

South to North Water Diversion Project

The South to North Water Diversion Project (SNWDP) is a gigantic water scheme intended to divert water from the Yangtze River and its tributaries to the water-starved north. The diversion will be conducted through three routes: (1) the eastern route will pump water up the coastal region to the north through a 1,200-kilometer long canal

from the lower Yangtze; (2) the middle route will be accomplished by building another equally long canal to tap the water resources from Hanjiang, the longest tributary of Yangtze; and (3) the western route will divert water from the upper reaches of the Yangtze and a few tributaries, namely the Tongtian, Yalong and Dadu rivers, to boost the supply of the parched Yellow River Basin.

Despite their environmental and social impacts, construction of the eastern and middle routes was initiated in 2002 and 2003, respectively. Among these impacts, one of the most challenging is to relocate around 300,000 rural residents displaced by the enlargement of the middle route source reservoir in Henan and Hubei provinces, both of which are densely populated and finding additional farmland for the resettlement will be extremely difficult. It is fair to say that the projects will result in the redistribution of an enormous amount of resources dramatically affecting the interests of different regions and millions of people. The central government had the final say and decided to proceed with the project. The fact that such projects could be implemented without undergoing much public discussion shows that the traditional top-down approach to water conflict resolution still functions—at least temporarily. Government officials hailed the project as another example of the advantage of socialism, which allows for the pooling of collective strength to do something big.

However, it is becoming increasingly difficult to push through projects like SNWDP. With the rising sense of individual and regional rights in Chinese society, the dominance of powerful political and economic interests has been increasingly challenged in recent years. In fact, the western route is facing mounting public scrutiny, despite extensive preparations already underway—most opposition is from Sichuan Province, from where the water will be taken.

Emerging Challenge to Central Authority (and the Western Route)

According to the current plan, construction of the western route is to begin by 2010. It is expected to take 40 years to complete the three phases of the project. By 2050, as much as 17 billion cubic meters of water (equivalent to 40 percent of Lake Erie's water) on an annual basis will flow from the Yangtze and its tributaries into the Yellow River. The total cost, based on year 2000 estimates, would reach 30.4 billion Yuan, or 60 percent of the cost of the whole SNWDP.

In July 2006, a group of experts in Sichuan—including sociologists, geologists, hydropower engineers, biologists, and professors from universities and officials from local government agencies—made public a *Memorandum on the Western Route Project of the SNWDP*, which they had jointly researched and drafted. According to a news media report, while the planning for Phase I of the Western Route Project (drafted by a subsidiary of the Yellow River Commission under MWR) had been studied and approved by a committee of central-level experts in 2001, local scholars and officials had no access to the planning document until 2005.²⁹

According to the report, the drafters of the memorandum dismissed the claim that the start of the eastern and middle route signaled approval to also start the western route. Instead, the group wanted a broad range of issues to be addressed first, including the: (1) retreat of glaciers on the Qinghai Tibetan Plateau and subsequent impact on water availability; (2) potential damage to the ecosystem of the Qinghai Tibetan Plateau; (3) impact on the hydropower generation of Yangtze Basin dams due to the losses of water; (4) compensation to the local residents; and (5) mitigation of environmental impact.

One of the reasons for increased social concern is the rising awareness of growing water scarcity. According to statistics compiled by China's water authorities, two-thirds of China's cities are water short (*Editor's Note: See Nickum and Lee commentary in this volume*). The media report sparked an uproar among the public—especially in Internet chat rooms and bulletin boards—in great part because the memorandum was released at same time that Chongqing and parts of Sichuan were experiencing their worst drought in decades.

This is but one example of the rising awareness of the protection of local and personal interests in a country that is facing scarcity of resources. In fact, the water scarcity in parts of China has become a matter of survival for certain disadvantaged groups and forces them to challenge the established powerful interests—an ongoing intergovernmental dispute between the capital Beijing and Hebei Province illustrates such a case.

CASE 1: Disputes between Thirsty Beijing and Hebei over the Juma River

China's capital city Beijing is surrounded by Hebei Province, from which originates most of the rivers

flowing across Beijing's jurisdiction. As the population of Beijing has risen sharply from 8 to 14 million over the past two decades, the city has intercepted and cut off most of the rivers flowing across its territory, with the Juma River being the only exception. The Juma River is a tributary of the Hai River that flows across the middle of Hebei Province with slightly more than 30 kilometers flowing through Beijing.

Beijing and Hebei each built a major water diversion project on the Juma River. Beijing, however, complained that it could not divert enough water to meet its demand because of Hebei's upstream diversion. Beijing had intended to build a reservoir to capture and store water from the Juma River, but its plan has been held up because of the strong opposition by Hebei Province.

Beijing suffered its fifth consecutive year of drought in 2003. The situation turned so bad in September 2003, that the city decided that it must tap its emergency reserve, including the Juma River, as well as the aquifer under its riverbed. Beijing developed a plan to raise the dam on the Juma River to hold more surface water within its territory. It also was moving forward to drill a cluster of more than forty wells to tap the subterranean flow of the Juma River. The water would be transferred through pipelines to Beijing's Yanshan Petrochemical Plant, the largest industrial water user of the city.

The Hebei government, however, had not been informed of Beijing's intentions and only learned about the projects by chance when a provincial water bureau official saw an online invitation soliciting bids for construction of the well drilling project. Beijing's water diversion project aroused great concern for the province, because Hebei was also suffering from its fifth consecutive year of drought. The Juma River, which was the only perennially flowing river in Hebei Province 10 years ago, is now dry most of the time. The drying up of the river in recent years has forced downstream residents in Hebei to tap the subterranean flow. Hebei believes that Beijing's water diversion project will cut off the water supply to the nine cities and counties downstream and severely affect the livelihood of nearly three million people in Hebei Province. Hebei also has voiced concerns that the diversion will exacerbate the desertification of croplands and threaten the ecology of the largest freshwater lake in north China, into which the Juma River flows.

The top leaders of Hebei Province became involved, sending a letter written in an unusually harsh tone to Beijing's water authority. Meanwhile,

a petition letter, signed by the villagers in Hebei's Laishui county, was delivered to Wu Bangguo, head of the National People's Congress, on 28 November 2003, appealing for the central government leaders to stop the "illegal" diversion project that would threaten the survival of 269,000 people.³⁰

Wu Bangguo provided his opinions in a report that directed MWR to coordinate and resolve the issue. The MWR minister, in turn, directed his staff and the Hai River Water Resources Commission to develop a solution.

The Hai River Commission proposed several stipulations in formulating a solution to the issue, including that the status quo on use of water from the Juma River should be maintained, which meant a mandatory suspension of Beijing's water diversion expansion project. And furthermore, Hebei Province was ordered to take measures to provide water to the Yanshan Petrochemical Plant, because it is the major provider of gas and heat to Beijing.

Guided by these stipulations, the two sides began negotiations that resulted in bitter quarrels and sharply conflicting opinions. While Hebei is considering selling some water to the capital, Beijing wants to ensure it gets its share of Juma River water for free. Beijing was forced to give up on its plans to grab most of the surface and groundwater from the Juma River. Nonetheless, by June 2004, it had completed a canal designed to divert much of the surface water and part of the groundwater to its Yanshan Petrochemical Plant.

Hebei's demands to resolve the conflict did prompt the upper levels to mandate some resolution, but lacking a true collaborative problem-solving process, the conflict has not been completely solved and will probably reemerge again in the near future.

Growing Challenge of Pollution Conflicts

Beside conflict over water distribution, the number of conflicts caused by water pollution is also increasing. The Songhua River toxic spill, which took place in November 2005, shut down the water supply of a city with over three million people and highlighted the seriousness of the problem. However, this spill is only the tip of the iceberg. According to the statistics provided by SEPA, by September 2006 another 130 water pollution incidents had occurred since the Songhua River toxic spill.³¹ A number of these incidents resulted in the shutting down of local water supplies.

China's top-down approach is being challenged by increasing difficulties in solving conflicts caused by water pollution—both accidents and the every day toxic pollution that cities and factories pump untreated into rivers, lakes, and streams. China's National Water Pollution Prevention and Control Law (adopted in 1984 and updated in 1996), stipulates that disputes over water pollution involving two or more administrative regions shall be settled through negotiation by the local governments concerned, or through coordination by their common superior government. But in reality, the superior agencies often feel powerless to handle highly contentious water pollution conflicts.

The dominating executive branch approach does enable government agencies to respond quickly to water conflict emergencies. With political and social stability upheld as the top priority of the ruling Communist Party, this approach is instinctively favored. However, emergency solutions are rarely able to effectively address the root causes of the problems, leaving many unresolved issues that often blow up again later as even more destructive social conflicts. The following case illustrates the inadequacies of China's top-down administrative approach to overcome local protectionism and how this failure serves to create additional problems.

CASE 2: Maxigang River—A Major Inter-provincial Water Pollution Conflict

Maxigang is a 13-kilometer river that flows from Shengze town in Suzhou city (Jiangsu Province) to Xiuzhou district in Jiaxing city (Zhejiang Province). With numerous lakes and ponds and a dense network of wetlands, the region is China's fish and rice basket.

Shengze town experienced a rapid expansion of the printing and dyeing industry in the 1990s, dramatically increasing wastewater. Statistics from Jiaxing city show that in the worst year, 90 million tons of "soy sauce" colored wastewater was dumped into the small river. The wastewater killed fish and crayfish downstream in Jiaxing. One pearl farm alone lost 20 million Yuan in a pollution spill in 2001.³²

Besides economic losses, which reached 56 million Yuan in 2001, the wastewater also threatened people's health and safety. From 1999 to 2000, northern Jiaxing reported several outbreaks of intestinal and diarrhea epidemics. In 2000, not a single young man in 12 villages in northern Jiaxing could

pass the physical examination for military service. Overall cancer rates in 8 towns in northern Jiaxing rose 28.2 percent from 1996 to 2001; the rate of alimentary tract cancer rose by 58 percent.³³

In 1995, several hundred angry Jiaxing fishermen and their family members dumped loads of smelly dead fish in the courtyard of the Shengze town government headquarters. This incident—considered an emergency—was reported to Zhejiang’s environmental bureau as well as the Environment and Resource Committee under of the People’s Congress, but they could not work out an effective solution. Thus, major pollution spills kept occurring every year.³⁴

This inter-provincial dispute was turned over to the State Environmental Protection Administration (SEPA), the highest environmental authority in China. Under the coordination of SEPA, a memorandum was signed in 2000, stipulating that Suzhou city provide Jiaxing city one million Yuan in compensation and that Suzhou officials guarantee that water flowing out of their jurisdiction meet discharge standards by the end of 2003.

The water pollution continued, however, and on 22 November 2001, angry fishermen in Jiaxing raised one million Yuan to take actions on their own. The fishermen used eight bulldozers to deposit several thousand sandbags and sink 28 boats loaded with cement to block the 50-meter wide Maxiang River.

News of the river blockage was sent to MWR early that morning and was then passed on to central government leaders. Premier Zhu Rongji and other cabinet members offered to intervene, prompting MWR and SEPA to send a joint taskforce team to the site. After meetings with the vice governors from Jiangsu and Zhejiang provinces, a new memorandum was signed, which stipulated that Jiangsu take urgent actions to shut down polluting factories and that Zhejiang remove the impromptu dam immediately.

The people in Jiaxing, however, would not allow the government officials and workers to get to the site because they did not trust the promises made by their polluting neighbor. On 8 December 2001, a vice-governor of Zhejiang Province went to the site of the confrontation and talked to hundreds of local people. He then met with local village chiefs and 20 representatives of local farmers and fishermen. That evening, local police ordered people away from the dam site and six days later the sandbags and boats were removed.

A joint monitoring scheme has been set up between Jiaxing city and Suzhou city and an

automatic monitoring station was installed on Maxigang River. However, Jiaxing side reported that Shengze began discharging pollution on weekends or rainy days, making it harder to collect evidence. Additionally, Shengze town began discharging through pipelines to another region in Jiaxing.³⁵

While the conflict between Zhejiang and Jiangsu has abated, the problems were solved in an *ad hoc* manner only after the situation became quite violent. None of the stakeholders were subsequently equipped with skills to address future water conflicts. However, this and other similarly violent water disputes have prompted government agencies, researchers, and NGOs to work on creating new tools and approaches for conflict prevention and resolution—ranging from market mechanisms, increased stakeholder involvement, and class action lawsuits.

Market-based Tools: Effective Use Requires Good Governance

From the late 1990s, Chinese water officials and researchers have been advocating market-based solutions to water quantity disputes. The first water deal took place in February 2001 between Yiwu and Dongyang cities in Zhejiang Province. Yiwu bought the permanent use rights for 50 million cubic meters of water annually from the neighboring Dongyang city at a cost of 200 million Yuan. Despite vocal support by senior water officials, this case caused a big controversy, for in China water is a public, not private, resource. Additionally, below the diversion the downstream city of Shengzhou complained that the water rights deal was made at Shengzhou’s expense.³⁶ Water officials and academic experts are examining this and other *ad hoc* trades to help design an acceptable tradable water rights system for China. One illustrative experiment with a market-based approach was used to resolve the conflicts involving the Zhang River—one of the most violent and prolonged water conflicts in modern China.

CASE 3: Violent Conflict on the Zhang River and the Trial of Market-Based Solutions

The Zhang River—within the Hai River Basin—originates in Shanxi Province and flows through Henan and Hebei provinces. Hebei’s Shexian and Cixian counties, which are located on the northern side of the river, share the water source with Henan’s Linzhou city and Anyang county on the southern

side. For centuries the villagers on both sides of the river had friendly relations and many became relatives through marriage.

However, the friendly relations were marred in the late 1950s, when the demands for water rose sharply. Under directives of the Great Leap Forward, local communities raced to build large and small water facilities to expand farming. One of the projects, the Red Flag Canal, which was dug through solid rock mountains, became a national model when it was completed in the early 1960s. People from all over China went to learn from the experience of Linxian county for creating a “milky way on earth” with their bare hands. The other side of the story, which was not publicly reported, reveals a less than rosy picture. The Red Flag Canal and other projects enabled excessive water withdrawals in the river and created severe water shortages. Thus, instead of bringing water, these projects brought decades of fighting and bloodshed. By the 1970s villages on both sides of the river even mobilized their own militias to help protect water for their farming.

In 1976, a local militia chief from Linzhou was shot to death in a violent clash between Shexian's Hezhang village and Linzhou's Gucheng village over the damming of Zhang River. In December 1991, Huanglongkou village of Shexian county and Qianyu village of Linzhou city mortared each other because of conflict over a water diversion facility, which resulted in a number of injuries.³⁷

In August 1992, bombs were set off along the Red Flag Canal. A section of the canal collapsed, inundating local villages and causing direct economic losses of nearly 10 million Yuan. That year, a special Zhang River Subcommittee was set up under the Hai River Commission to address the violent situation. The initial weakness in the committee was apparent in that conflicts continued into the late 1990s culminating in three major violent incidents:³⁸

- In March 1997, several hundred villagers from Baishan village (Shexian county) and Qianyu village (Linzhou city) were desperate to get water for their crops, which led to a violent clash leaving several dozen villagers injured.
- In 1998, Water shortages were so intense that villages in Henan and Hebei fired mortars and destroyed each other's water diversion facilities.
- On Chinese New Year in 1999, villagers from Shexian's Huanglongkou village and Linzhou's Gucheng village used bombs against each other,

injuring nearly 100 villagers and causing one million US. Dollars of damage to houses and water facilities.

In the spring of 2001, northern China was hit by another drought and the flow in the upper reaches of the Zhang River dropped to three cubic meters per second, creating a water shortage that threatened to spark yet another bloody conflict. However, the Zhang River Subcommittee—which had been working hard to build communication among stakeholders throughout the basin—brokered a deal in which Shanxi Province agreed to sell extra reservoir water it held in the upper reaches of the river to the drought stricken Hebei and Henan provinces. The first deal was made in April 2001 when 15 million cubic meters of water was released by the Zhangze Reservoir in Shanxi followed by a 30 million cubic meters release in June. In the spring of 2002 Hebei and Henan bought another 30 million cubic meters of water.³⁹

The case was praised as a win-win solution. Upstream dams in Shanxi Province received payments of 1.4 million Yuan, downstream Hebei and Henan provinces avoided agricultural losses of 50 million Yuan, and the downstream hydropower stations generated 1.2 million Yuan worth of power. Most critically, the sale succeeded in helping to prevent further violence over water shortages that had troubled the region since the 1970s.

By attempting to clarify tradable water rights, Chinese officials and academic experts hope to reduce the conflicts caused by the confusion over who has legal access to limited water resources and to promote the fair transfer of limited resources from lower to higher profit margin uses. Theoretically, a market-based approach seems promising; however, it will be a tremendous challenge to determine a fair distribution of initial water rights in China. The determination process itself can be expected to be controversial and cause additional conflicts. Furthermore, the trading of water rights provides fewer options and flexibility in times of continuous drought. After buying water from Shanxi for two years, for example, Henan residents in the Zhang River valley have now begun to construct a large reservoir on a major tributary of Zhang River to address their continuing and unresolved water supply needs. Without market mechanisms or collaborative problem-solving processes to encourage conservation, this new dam could fuel future conflicts.

Reflections on Free Market Solutions to Water Conflict

The perceived success of free market reforms in bringing millions out of poverty in the 1980s led many progressively minded Chinese experts and the majority of the public to believe that the invisible hand of the market can sort out social problems and bring China a more efficient and fairer society. However, by the 1990s it became clear that market-based reforms also have created growing social problems such as a widening of the income gap, rising education costs, and a deteriorating medical care system. Such problems have prompted many Chinese to rethink such a strong reliance on a market-based approach to scarce resource issues. Specifically, it has become clear to many that a market-based economy that does not give the public access to information or permit stakeholder involvement cannot produce a stable society and sound economy. Thus, in terms of water problems, the effective use of market-based tools—such as pricing schemes and defining water rights—cannot rely fully on a centralized approach to water management; rather, what is called for is the utilization of more bottom-up, transparent and participatory processes.

CREATING A FOUNDATION FOR COLLABORATIVE PROBLEM SOLVING IN CHINA: TOP-DOWN LAWS PROMOTING STAKEHOLDER INVOLVEMENT IN WATER MANAGEMENT

While China's water management seems to be leaning toward a more centralized model, the country's environmental management is undergoing major changes. Ever since 2003, there has been an increasing focus on public participation, corresponding with progressive changes in China's environmental laws.

Just like NEPA triggered public participation in environmental affairs in the United States, Chinese participation in the environmental sphere also began with a procedural law, namely the Environmental Impact Assessment (EIA) Law, the first Chinese law that requires public participation in government decision-making processes. This law is highly relevant to water conflict resolution because all construction projects—many of which could produce water conflicts—are legally required to undertake an EIA. Thus, if the law is followed, the Chinese public will have a say in the decision-making process for those projects.

Like many other laws in China, the EIA Law is merely a guideline and the requirement for public participation is very briefly stated. Still, it has provided the initial legal cornerstone for ensuring public participation in governmental decision-making processes. Since its passage, additional laws, regulations and policies have been established following the same principles. Together, they have laid a legal foundation for a new way of water management by opening the door to collaborative decision-making processes.

The Environmental Impact Assessment Law

The EIA Law, which became effective on 1 September 2003, clearly states, "The nation encourages relevant units, experts and the public to participate in the EIA process in appropriate ways." According to the law, for projects that may cause negative environmental impacts and directly involve public environmental interests, the institutions of project planning should seek opinions from the relevant units, experts and public over the draft EIA report, by holding evaluation meetings and hearings...before the draft is submitted." In addition, "the institutions should seriously consider the opinions of the relevant units, experts and the public over the draft EIA law, and should attach explanations for adopting or not adopting the opinions when submitting the EIA report."

The State Council's Guidelines on the Comprehensive Implementation of Administration By Law

These guidelines, which were issued on 22 March 2004, stressed major internationally accepted good governance principles such as transparency, participation, and the rule of law. According to the guidelines, apart from national and business secrets and private matters, Chinese administrative institutions should disclose and allow the public to review governmental information. When discussing how to build more democratic decision-making processes, the guidelines require the government "to clearly define the administrative decision-making power of all levels of governments...and improve the regulations for internal decision-making," as well as establish a more transparent administrative decision-making process that brings in public participation and outside expert review.

Specifically, the guidelines require that information on government agency decision-making for projects or plans be disclosed and accessible to the

public through seminars, hearings, and evaluation meetings, all of which should collect opinions on the projects or plans. The guidelines establish the policy basis for a more transparent and participatory decision-making process. Various government agencies have been ordered to revise their rules and regulations in accordance with the principles set forth by the guidelines. SEPA was one of the first agencies to issue their own implementation documents supporting these guidelines.

The Administrative License Law

Enacted on 1 July 2004, the Administrative License Law (ALL) requires that administrative institutions reviewing applications for permission or licences for new projects or plans must inform and solicit input from any third party that has a major interest in (or will be impacted by) the projects or plans (e.g., citizens living in farmlands that will be inundated by a new dam being proposed). The law requires administrative institutions to inform the applicants and stakeholders about their rights to demand a hearing. Applicants and stakeholders must submit an application for a hearing within five days of being informed of their rights, and the administrative institutions are required to organize a hearing within 20 days of receiving the application.

Bottom-Up Movement to Increase Stakeholder Involvement in Water Management

These new policy and regulatory tools still need to be tested, in terms of actual application to promote collective problem solving in water conflicts. Fortunately, social conditions in China appear conducive to these new opportunities:

- There is growing public awareness regarding pollution and ecological degradation, along with their impacts on public health and living standards.
- Top party leaders are promoting a new view of more balanced and sustainable development, publicly committing themselves to the establishment of a “harmonious society,” with harmony between humans and nature being one of the key themes.
- The Internet, with more than 100 million users in China, has dramatically enhanced transparency on environmental and social issues—a much needed first step in improving environmental decision-making processes.

- Since the country’s first environmental NGO was registered in 1994, Chinese green groups have established their reputation and developed their capacity to begin addressing even environmental transparency issues.⁴⁰
- Some Chinese NGOs and private lawyers have been helping water pollution victims navigate their way through the courts to punish polluting industries and to receive compensation.

First Major Grassroots Campaigns on Water Management

Public participation in water management projects began with a few large hydropower projects. China is facing serious shortages of both water and energy as its rapid economic expansion further strains its limited natural resources. This has prompted a new round of hydropower development proposals in a country that with 86,000 dams is already the most dammed in the world. China’s installed hydropower capacity reached 100,000 megawatts in 2004, making it the biggest hydropower user in the world. According to plans drafted by China’s central planners, the country is looking to nearly triple its hydropower capacity by 2020.

Such massive river development is unprecedented; it dwarfs the rest of the world’s hydro schemes. Local NGOs and environmentalists worry that the current hydropower “craze” will severely overexploit China’s rivers and result in serious environmental and social harm. They argue that tripling China’s hydropower capacity would mean virtually the end of pristine rivers in China, the fragmentation of ecosystems within China and in downstream neighboring states, and the



Walking along the beautiful Nu River (Nujiang), a wild river that flows through China, Burma, and Thailand. Plans by the Yunnan provincial government to build a cascade of 13 dams on the Nujiang have sparked strong opposition from grassroots groups, which stress the marked lack of transparency in the dam decision-making process. © Wang Yongchen

impoverishment of biodiversity. Environmental activists and researchers predict that hydro expansion is highly likely to displace more than one million people from their ancestral homeland in the deep valleys of China's hilly southwest.

Such is the backdrop against which the "rising rivers movement" in China has emerged. Since 2003, many Chinese NGOs follow dam issues, even making high-profile challenges against a series of dams that they believe will be the most damaging:

- NGOs informed the public and media about how Yangliuhu Dam would harm the 2,220 year-old Dujiangyan irrigation system that is, amazingly, still serving millions of people today. This system was deemed a World Cultural Heritage site in 2001. Some 180 media reports combined with public dissent finally forced the developer to abandon the project in 2003.
- In 2004, Chinese NGOs turned their focus on a cascade development project on the Nujiang, one of the last two free-flowing rivers in China. Their efforts aroused national public attention on the fate of a remote river that was unknown to most Chinese until then. Again, widespread public concern and strong attention focused on the project by the news media finally led the Premier Wen Jiabao to halt the project pending a more comprehensive EIA.
- Since July 2004, environmentalists have been working to preserve the Tiger Leaping Gorge, creating a campaign to shed light on a massive dam project that will devastate this spectacular landscape and the rich cultural diversity, which has provided a stable economic life for 100,000 people.

Most of the local NGOs doing this work are not ideologically against dams, rather proponents of transparent decision-making. They understand that China needs power to support its rapid economic growth and to meet the rising demand from a more affluent society. What they cannot accept is the mentality still dominating the hydropower sector that views every existing gorge as a good dam site. These Chinese environmentalists are urging the agencies and developers before they take on the damming of any new gorges to review the hard lessons from the past 50 years: (1) failure to properly resettle millions of displaced residents, (2) destruction of ecological balance, (3) loss of biodiversity, (4) destruction of natural and cultural heritage sites, (5) severe sedimentation problems that have

made some of China's largest dams uneconomical, (6) exaggeration of potential benefits, and (7) cost and time overruns of past projects. Chinese NGOs are stressing that many of these shortcomings stem from the lack of a fair and transparent process to decide on dam issues.

These problems emerged in part by allowing decisions on large dams to be determined solely by government officials, developers and technical experts, who can make—often-profitable—agreements among themselves. NGOs and environmentalists assert that no interest groups or individuals should be permitted to make easy money by externalizing huge costs on displaced people, on society in general, on the national economy, and on the environment. They argue that best-practice planning for China's energy future requires an open and transparent decision-making process for dams and other energy-generating projects that provides for participation by stakeholders and ensures full access to information.

Trying out the New Public Participation Policy Tools

China's environmental authorities have wanted to integrate public participation into decision-making processes through the use of formal public hearings. However, cases like Nujiang are considered too sensitive to experiment with such new tools. When SEPA was looking for a suitable situation for conducting a public hearing, the dispute over installing plastic sheets to line the bottom of the lake at Yuanmingyuan, the Old Summer Palace, was selected as a safer opportunity for trying out new approaches to public involvement.

The Yuanmingyuan management authorities chose to line the bottom of the lake with plastic sheets to prevent the seepage of precious water resources. But many people were suspicious of the move, wondering whether it was for economic gains of the management, worrying that it may damage the cultural heritage site. SEPA managed to hold an environmental public hearing on the dispute in April 2003, the first of its kind in China on the national level. Seventy-three representatives from all walks of life participated and stated their views on the project.

Without a completed EIA report, this public hearing functioned more like a pre-hearing meeting designed to collect information and opinions. A following-up hearing after the EIA report was drafted should have been conducted, but one was

never held. Some were left to wonder whether the process was cut short due to political pressure. Nonetheless, the case did result in a significant milestone—the full draft EIA report was posted on the SEPA website, satisfactorily addressing the rights to know of concerned citizens. Most likely other relatively less sensitive cases will have to act as testing grounds for new laws and pushing forward public participation in water conflicts. The Yuanmingyuan case illustrated that in China public participation should and could start with environmental information access, where there is already a solid legal and policy basis.

CREATING ADDITIONAL INCENTIVES FOR COLLABORATIVE PROBLEM SOLVING

What can be done to create additional incentives for pursuing collaborative problem solving approaches to water management conflicts in the United States and China?

United States

In the United States while a number of policy directives have been issued by the current and previous administrations to encourage federal agencies to engage with other agencies and stakeholders on a more cooperative and collaborative basis, additional incentives are likely to be required to result in significant long-term improvements:

Improve Funding. Lack of available funding is one of the major obstacles to more extensive use of collaborative approaches to water conflict resolution. Because of the current pervasive mistrust of federal agencies among states, tribes, local governments, and NGO stakeholders, the use of independent impartial conveners, mediators, and facilitators is likely to be essential for the near term, to help ensure confidence in the integrity and fairness of agency-sponsored collaborative processes. Unfortunately, using such outside mediators is quite costly for federal agencies, creating substantial disincentives to use them.

The USIECR, for example, is an independent agency staffed by federal employees that could conceivably provide mediation services at little or no cost to collaborative processes sponsored by other federal agencies. However, in establishing the U.S. Institute, Congress expected it to supplement its modest operational funding by directly charging

other federal agencies for its services. Because of its small staff, the USIECR generally must subcontract with private sector mediators to respond to the demand for its services. The costs of these private sector mediators must then be passed along to the sponsoring federal agency. Because the cost of providing independent mediators is considerable under these current arrangements and because the annual budgets of federal agencies with natural resource management and environmental protection responsibilities are severely constrained, it is unlikely that the use of collaborative problem-solving approaches will increase significantly in the near term. To change this scenario, Congress would need to provide additional funding so that independent mediation assistance could be provided at little or no cost, or so that federal agencies could more easily afford to pay for these services. Neither option is very likely given the present federal budget deficit situation and the current political climate.

Revision of the Federal Advisory Committee Act. Revising this act to remove the obstacles it presents to federal agencies wanting to meaningfully engage nongovernmental stakeholders and the public in environmental problem solving would help eliminate a key disincentive to pursuing collaborative approaches. This would appear to be an achievable short-term goal.

Lack of high-level support. More prominent support by elected and appointed public officials for specific collaborative efforts could increase the incentives for parties to participate. Public officials could also take a more positive and proactive role in bringing together people with diverse perspectives to work on solving shared water and other environmental problems.

Maintain NEPA and Endangered Species Act (ESA). The need to build consensus to move forward on solving common environmental problems is a necessity under the U.S. political system. Nonetheless, there are occasions when one faction or another becomes emboldened to think it has the power to unilaterally pursue its own policy objectives without building bipartisan support to develop mutually acceptable compromise solutions. For example, lately, concerns have been raised about what appears to some to be unilateral partisan attempts to substantially change ESA and NEPA to ensure more favorable outcomes for the proponents' supporters. While there is broad

agreement that both laws could benefit from being updated to be more responsive to current conditions, significant reductions in their authorities and scope could result in reducing the incentives that their very clout creates for encouraging collaborative environmental problem solving.

China

The kind of collaborative environmental problem solving utilized in the United States could be adopted in China only when powerful interests are no longer able to dismiss the interests of the others. In the United States the real incentives for different interests groups to come to the negotiation table are powerful laws such as NEPA and ESA, as well as the uncertainties of prolonged and costly court process. While in the United States one challenge is how to maintain these incentives by keeping the authority and scope of these laws, in China the challenge is how to create such incentives by enforcing existing laws and by making new laws.

Enforce Existing Laws

Legal tools such as EIA laws and the Administrative License Law in theory should help promote collaborative environmental problem solving, because they set procedural requirements to involve stakeholders. However, their enforcement remains weak and in reality, stakeholders, especially the disadvantaged groups who will be most affected, are not informed and do not have a say in the decision-making process. And it remains difficult to seek court endorsement for these procedural rights. This is a serious disincentive for the powerful interests to consider negotiating with other interest groups.

Nevertheless, the cases of public participation that have delayed a few large infrastructure projects have sent a signal to many that the domination of decision-making process by a few power groups may come to an end some day. At the moment, the powerful interests are trying to maintain the old, top-down, unilateral way of dealing with water conflicts. Some local officials and bureaucrats from some agencies are also in favor of the old ways, as it is so much easier to handle than the participatory process. Now there is an intense tussle between the powerful interests and the environmental groups in China over public participation procedures, the result of which will determine how much collaboration there could be in environmental problem solving.

Create More Laws to Support Public Participation

China needs to revise existing laws and regulations and make more laws to support stakeholder involvement. The State Council Guidelines mentioned previously has ordered various government agencies to revise their rules and regulations in accordance with the principles set forth by the guidelines. SEPA was one of the first agencies to issue their own implementation documents supporting these guidelines. However, some other agencies, including the powerful water authorities, have not responded to the guidelines in a speedy way.

Furthermore, the challenge to create incentives for collaborative environmental problem solving may be bigger than expected in China than in countries like United States, where long before NEPA was enacted the Administrative Procedural Act and Freedom of Information Act laid foundations for transparency and participation. However, no similar national laws exist in China, meaning that the environmental legislation is burdened with the transformation of broad legal and administrative infrastructure. As a result, it is far more difficult to move forward on creating collaborative decision-making guarantees.

BUILDING INCREASED CAPACITY FOR COLLABORATIVE PROBLEM SOLVING

The commitment of time and effort required to develop collaborative solutions to controversial water management issues is typically substantial, particularly in China which is in the initial stages of creating the basic institutions and legislation. Participants and citizens in both countries cannot afford to spend valuable time and limited resources on ineffective or unsuccessful collaborative processes. Building institutional capacity at the agency and organizational level and improving the individual participants' skills necessary for productive collaboration are fundamental requirements for increasing the effective use of environmental conflict resolution and collaborative problem-solving approaches.

Capacity-Building Efforts in the United States

As mentioned above, in the United States a number of initiatives are currently underway at the federal agency level to build institutional capacity for more

SPOTLIGHT ON NGO ACTIVISM IN CHINA

Chinese River Defender Yu Xiaogang Wins 2006 Goldman Environmental Prize for Asia



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On 24 April 2006, Yu Xiaogang, the founder and director of the Chinese NGO Green Watershed, was awarded the prestigious 2006 Goldman Environmental Prize for his pioneering work in protecting rivers and watersheds in China. Mr. Yu has led a citizens' movement to protect China's rivers and people from the impacts of dams, and has been a key player in the movement

to protect the Nujiang, one of only two free-flowing major rivers in China. In 2004, Mr. Yu was a participant in the China Environment Forum's exchange and research project focused on promoting river basin governance in China. A webcast of his talk at the Woodrow Wilson Center on 28 April 2006 is available on the China Environment Forum website www.wilsoncenter.org/cef.



effective collaboration in solving environmental problems. Efforts are focusing, in part, on changing the culture of the federal government to better support and reward collaboration. Employee recruiting and hiring, performance standards, rewards and promotions are all being modified to enhance collaborative attitudes and skills within the federal workforce. Providing training to increase collaboration skills is also a key strategy for building capacity.

Some U.S. agencies have developed or are beginning to develop internal programs that provide in-house expertise, mediation assistance, and advice on collaborative approaches to resolving controversial environmental problems. Notable examples include:

- Conflict Prevention and Resolution Center within EPA;⁴¹
- Office of Collaborative Action and Dispute Resolution within the Department of the Interior;⁴²
- Bureau of Land Management's Alternative Dispute Resolution and Conflict Prevention Program;⁴³
- U.S. Forest Service's National Partnerships Office, which works to increase the agency's effectiveness in partnership and collaboration with citizens, communities, and NGOs.⁴⁴
- Dispute Resolution Service within the Federal Energy Regulatory Commission, which is an independent federal agency that regulates interstate transmission of natural gas, oil, and electricity, including the licensing of nonfederal hydroelectric dams;⁴⁵ and,
- Federal Highways Administration's Office of Planning, Environment, and Realty within the Department of Transportation, which has developed guidance and associated training workshops on dispute resolution and collaborative problem solving for use by the various federal and state agencies involved in the development of federal highway projects and related environmental reviews required under NEPA.⁴⁶

In the United States, NGOs also are beginning to develop their internal capacities to engage more productively in collaborative problem solving efforts—even those that have traditionally focused almost exclusively on litigation strategies to accomplish their objectives. The Center for Biological Diversity, for example, which has gained the reputation as one of the most litigious NGOs regarding endangered species issues, recently hosted several

training workshops on collaboration to which they invited federal agency staff and conservation allies, as well as traditional opponents.⁴⁷

In addition to building institutional capacity for conflict resolution, collaborative skills development is also commonly incorporated into the early stages of collaborative problem solving efforts. Building effective collaboration skills among participants is a critical aspect in determining whether or not a process will be successful. The numerous government participants involved in a water dispute report back to a wide range of bureaucratic organizations, each with different ways and procedures for making decisions. Notably, very few of these individual participants will have ever been exposed to collaboration skill development opportunities as part of their background, professional education or training. Yet managing and resolving conflicts and pursuing collaborative problem solving opportunities has often become a major focus of their work duties and official responsibilities.

Capacity Building for Collaborative Problem Solving in China

China has experienced a top-down way of governance for thousands of years. Terms referring to good governance principles—such as stakeholders, transparency or participation—only came into use a few years ago. Therefore the learning curve on collaborative problem solving could be long, which does not mean preparation for such processes should be delayed. In terms of EIAs, government agencies and construction companies must learn how to organize transparent and fair stakeholder meetings and carefully respond to the public's concerns. NGOs and the public need to develop their skills in effectively preparing their participation in such meetings. All participants will need to learn how to listen to other people's opinions carefully and to express their own opinions calmly and logically. One very promising sign of "preparation" for participatory rulemaking was the fact one NGO was present in helping government and EIA firms design the regulations for public participation in the EIA process. (*Editor's Note: See Buckley commentary in this issue*).

NGOs in China have made great strides in increasing their impact on environmental policymaking and in becoming stakeholders to help push for greater transparency in water management and pollution cases. Even fairly confrontational methods such as assisting pollution victims in class action

suits is playing an important role in educating the public of their rights and power. Such awareness building is crucial for the creation of a stronger environmental governance system in China. In regards to NGO capacity, they do face obstacles due to restrictive registration regulations and their own limited internal capacity. Nevertheless, there has been a growing number of NGOs working to protect water issues in China, particularly around dam construction and water pollution. (*Editor's Note: See Birnbaum and Yu article in this special report*). Some local grassroots NGOs, such as Beijing-based Green Earth Volunteers, have held training workshops in a dozen cities on environmental information access and the organization of public hearings.

CLOSING THOUGHTS

In the United States, the use of collaborative approaches to addressing water management conflicts has established a strong foundation for increased application and improved methodologies. It appears that this is a direction to which the federal government is committed. The question remains, however, whether sufficient resources will be devoted to these efforts to ensure they can be truly effective in developing sustainable solutions. There are many lessons in the United States that could help promote collaborative problem solving for water conflicts in China. For example, third party mediators for water conflicts will eventually become a major asset to help solve water conflicts, but many new legal and political institutions would have to be built up first. The Institute for Environmental Conflict Resolution represents a promising model for China that Chinese government and nongovernmental stakeholders should begin studying now. In general, the topic of water conflict resolution could become a fruitful area for bilateral collaboration between the United States and China. The painful lessons learned in the United States might well make the Chinese experience with mitigating water conflict a faster, if not easier, process.

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NOTES

1. "Report and Recommendations of the SPIDR Environment/Public Disputes Sector Critical Issues Committee." Adopted by the Society of Professional In Dispute Resolution (SPIDR) Board, January 1997.
2. Authors of the SPIDR Report indicated that their focus was on government agencies and users in the United States and Canada and that, "While potentially applicable to other countries, the recommendations will likely need to be tailored to the political frameworks, institutions, and cultural norms in those societies."
3. The Public Solutions System is based on principles of: transparency and accountability, equity and inclusiveness, effectiveness and efficiency, responsiveness, forum neutrality, and consensus-based decision-making. For more information see: www.policyconsensus.org.
4. Agreement to use a "Comprehensive Study" framework was a key negotiation tool that allowed the southeastern states of Alabama, Florida, and Georgia to move forward in efforts to resolve their conflicts over water management of the Alabama-Coosa-Tallapoosa and the Apalachicola-Chattahoochee-Flint river basins, a situation commonly referred to as the "Tri-State Water

Wars.” Likewise, a key initial phase of efforts to determine exactly how to restore the Everglades ecosystem in southern Florida, was to collaboratively conduct a Comprehensive Review Study of a multi-purpose water management project originally authorized in 1948, to provide flood control, water control, water supply, along with other services that were now recognized to be significantly contributing to the decline of the south Florida ecosystem.

5. The United States has a complicated system of water rights related to priority access and use of surface and subsurface waters. These rights differ between the eastern and the western United States and among states. Resolution of disputes over “water rights” is generally formalized through the court system because of the legal verification it can provide. Allocation of water rights to some tribes have been negotiated and then formalized through an Act of Congress. Conflicts over the way available water is managed, especially during times of drought, are increasing in frequency. Solutions must often be negotiated because their complexity does not lend themselves to straightforward legal resolution. That said, court rulings may be helpful and sometimes necessary to establish a legal requirement or to establish parameters within which productive negotiation on collaborative solutions can then take place.

6. Acre-feet are commonly used to measure water for irrigation in the US. An acre-foot of water is the amount of water required to cover one acre of land one-foot deep. An acre-foot equals 325,851 gallons of water.

7. The Yangtze River in China is very similar in that dams, dikes, and land reclamation have exacerbated flooding problems, threatened fish species, and destroyed wetland ecosystems.

8. Information about the Missouri River Recovery Implementation Program can be found at: <http://www.nwd-mr.usace.army.mil/rcc/index.html>

9. For a copy of the *Situation Assessment Report on the Feasibility and Convening of a Missouri River Recovery Implementation Committee*, conducted by CDR Associates under contract to the U.S. Institute, see: <http://missouririver.ecr.gov>

10. For information about the Comprehensive Everglades Restoration Program, see: <http://www.evergladesplan.org/>

11. For information about the CEQ, see: <http://www.whitehouse.gov/ceq/>

12. For a copy of an “Assessment of Opportunities for Multi-Stakeholder Collaboration,” see: http://www.ecr.gov/pdf/everglades_final_report.pdf

13. For more information see: http://www.sfstore.org/issuetteams/csp_advisory_team/index_.html

14. For additional information about the Platte River Recovery Implementation Program, see: <http://www.usbr.gov/newsroom/newsrelease/detail.cfm?RecordID=12022>

15. Copy of NEPA is available at: <http://ceq.eh.doe.gov/nepa/regs/nepa/nepaeqia.htm>

16. NEPA allows other federal agencies and tribal, state, or local governments to request to be a “cooperating agency” with the lead federal agency, if they share jurisdiction over an issue or have special expertise with regards to any aspect of the environmental impacts of a proposed action.

17. “Cooperating Agencies in Implementing the Procedural Requirements of the National Environmental Policy Act,” guidance memorandum from CEQ Chair James Connaughton to the heads of all federal agencies, January 30, 2002. See: <http://ceq.eh.doe.gov/nepa/regs/cooperating/cooperatingagencies-memorandum.html>

18. U.S. courts generally give great deference to federal agency expertise regarding the substantive aspects of their decisions. Consequently, most litigation is based on alleged procedural violations. If plaintiffs prevail, the courts generally remand a decision back to the federal agency to rectify the procedural inadequacies of their decision-making process. Despite these limitations on the legal recourses available in challenging federal decisions, it does mean that opponents can significantly delay federal actions, especially if cases go through extended appeal processes.

19. The Endangered Species Act is so powerful that special elevation procedures to the Endangered Species Committee (the so-called “God Squad”), composed of seven Presidential Cabinet officials and a representative of the affected state that has the authority to overrule a FWS determination that a proposed action would result in “jeopardy” to an endangered species, has only been used on three occasions.

20. Mechanisms that allow for and encourage negotiated solutions include: comprehensive multi-species habitat conservation plans, candidate conservation agreements, safe harbor agreements, conservation banking, impact fees, tradable development rights, conservation easements, adaptive management approaches, and delegation of certain authorities to states.

21. ADRA’s requirement that agencies designate a senior official as a dispute resolution specialist provided the impetus for all federal agencies to begin building their capacity for dispute resolution. Subsequent executive orders and memoranda to the heads of federal agencies issued by the President have further reinforced this policy.

22. The April 2005 Final Report of the National Environmental Conflict Resolution Advisory Committee is available at: www.ecr.gov

23. For example, where NEPA calls for productive harmony, the protection of health and environmental quality, sustainability and general welfare, environmental conflict resolution practices call for balanced representation of affected interests and values. Where NEPA calls for social responsibility, intergenerational welfare,

sustainability and stewardship, environmental conflict resolution calls for full consideration of the short- and long-term implications of agreements and decisions, responsible and sustained engagement of all parties and wide access to the best available information.

24. A copy of the memorandum and the *Basic Principles for Environmental Conflict Resolution and Collaborative Problem Solving* is available at: www.ecr.gov

25. A copy of the *Executive Order on Cooperative Conservation* and additional information is available at: www.cooperativeconservation.gov

26. The National Park Service Director's Order 75A on Civic Engagement and Public Involvement is available at: <http://www.nps.gov/policy/DOrders/75A.htm>

27. Notably, each branch of the federal government has distinct and limited means and approaches for resolving conflicts that arise over environmental policy and governmental decision-making. While the legislative branch can establish general policies and authorize funding for specific governmental activities, the U.S. Congress has limited ability to actually resolve highly technical and complex environmental conflicts. This responsibility falls to the executive branch, which includes agencies with technical expertise and legislatively authorized management jurisdiction over different aspects of the environment, public lands, and natural resources. One of the significant challenges for the executive branch, however, is that Congress has established different missions for the different executive branch agencies, which often come into conflict when trying to address difficult environmental problems. Most complex environmental problems—and their potential solutions—cross the jurisdictional boundaries and authorities of different federal agencies, frequently resulting in interagency power struggles over which agency is the lead and ultimate decision-maker, as well as disagreements over which agency's decision-making procedures should be followed. Another feature of the American governance system is that U.S. law allows private citizens and NGOs to challenge certain executive branch decisions, primarily on procedural grounds (For example, citizen lawsuits can challenge whether an agency has followed the required procedures established by law and regulations for analyzing the environmental impacts associated with making a federal decision). If these challenges cannot be resolved through administrative hearing procedures within the executive branch, the case may enter into the federal judicial system for resolution. Judicial resolutions, however, usually focus on resolving narrow legal interpretations of alleged procedural violations. Rarely, are the federal courts able to issue a ruling that actually substantially solves complex environmental problems. The most common ruling is to remand a case back to the executive agency with jurisdiction to redo or rectify the procedural errors.

28. Du Fanghong & Huang Wanhao. (2005). "Approaches on ecological environmental problems in

Alashan area." *Inner Mongolia Environmental Protection*, 3 (Volume 17).

29. *21st Century Economic Report*. (24 August 2006).

30. *The Beijing News*. (25 February 2004). "Beijing and Hebei vie for the water rights of Juma River."

31. *Xinhua News Agency*. (10 September 2006). "A water dispute occurs in China every two to three days."

32. *Jiaxing Daily*. (24 November, 2001) "Conflict between Jiaxing and Shengze Escalated in Pollution Spill."

33. *The Bund*. (7 March, 2003). "A decade-long inter-provincial water pollution dispute between Jiangsu and Zhejiang."

34. *Jiaxing Daily*. (24 November, 2001). "The conflict between Jiangsu's Shengze and Zhejiang's Jiaxing escalated by wastewater spill."

35. *The Bund*. (7 March, 2003).

36. *China Youth Daily*. (19 April, 2001). "Shengzhou unhappy with Dongyang's water deal."

37. *China Water Resources Daily*. (19 March 2002). "True record of the upper Zhang River water conflict resolution by Henan."

38. *China Water Resources Daily*. (19 March 2002).

39. *China Water Resources Daily*. (19 March 2002). "Coordination, distribution and diversion."

40. To read about Chinese NGOs working on water issues see Part II in: *Reaching Across the Water: International Cooperation Promoting Sustainable River Basin Governance in China* at www.wilsoncenter.org/cef.

41. For information about EPA's Conflict Prevention and Resolution Center see: <http://www.epa.gov/adr/index.html>

42. For information about the Office of Collaborative Action and Dispute Resolution see: <http://www.doi.gov/cadr/>

43. For information about the Bureau of Land Management's Alternative Dispute Resolution and Conflict Prevention Program see: <http://www.blm.gov/adr/index.html>

44. For information about the Forest Service's National Partnerships Office see: <http://www.fs.fed.us/aboutus/partnership/index.shtml>

45. For information about the Dispute Resolution Service within the Federal Energy Regulatory Commission see: <http://www.ferc.gov/legal/adr.asp>

46. For a copy of *Collaborative Problem Solving: Better and Streamlined Outcomes for All – Guidance on Managing Conflict and Resolving Disputes Between State and Federal Agencies During the Transportation Project Development and Environmental Review Process*, see: <http://www.environment.fhwa.dot.gov/strmlng/adrguide/index.asp>

47. For a copy of the Press Release issued by the Center for Biological Diversity on the collaboration workshops see: <http://www.biologicaldiversity.org/swcbd/PRESS/collaboration>

NGO Strategies to Promote River Protection and Restoration

By S. Elizabeth Birnbaum and Yu Xiubo

The great river systems of China and the United States have been intensively developed to further economic goals but at the cost of polluting drinking water; reducing species diversity; interfering with ecosystem services like fishery production, water purification, and flood control; and eliminating opportunities for human enjoyment of natural rivers. In response, nongovernmental organizations (NGOs) in both countries have attempted to protect and restore natural river systems by stopping ill-conceived dam projects before they start, promoting greater public involvement in the decision-making on dams, and advocating for the removal of some older, potentially dangerous dams. And while NGOs in the two countries boast some successes—and also insightful failures—in such river protection campaigns, they face different political contexts and rely on different mechanisms to achieve their goals. Chinese NGOs are far younger than their U.S. counterparts and lack many of the legal and legislative avenues available in the American political context. While U.S. NGOs may offer lessons for those in China interested in promoting broader debates on dams, similar NGO advocacy trends have grown in both countries around dam building. For example, in both China and the United States campaigns to promote more transparency in dam decision-making have helped build NGO capacity and create national networks of NGOs. While dam advocates may perceive NGOs as creating conflict in their calls to block or modify dams, NGOs in both countries have become catalysts for collaboration between dam builders and affected communities. Thus, NGOs can be key players in promoting



China is home to the largest number of dams in the world. Southwest China is in the midst of a dam-building boom—a number of new dams are sparking domestic opposition from grassroots groups and increasing tensions on international rivers such as the Lancang (Mekong). The Manwan Dam (pictured), the first dam built across the Lancang River, was completed in 1996. © Marcus Rhineland.

resolution of disputes sparked by planned dams and other development on rivers.

AVOIDING PROBLEMS BEFORE THEY START—FIGHTING ILL-CONCEIVED DAM PROJECTS

In the case of river ecosystems, one of the easiest ways to avoid creating difficult-to-fix problems is by avoiding the construction of ill-conceived dam projects that radically transform river systems for minimal benefit—in short, following the simple rule, “if you don’t break it, you don’t have to fix it.”

Not every dam is ill conceived or should be stopped, but new dam proposals must meet a high standard to demonstrate their social value. In

America, the simple truth is that society has built dams on the most cost-effective sites already, and new proposals for dam sites are likely to yield diminishing returns. In China, the hydropower production potential is still great and over 200 dams are planned in the southwestern region of the country to help alleviate severe energy shortages. Moreover, the Yangtze River Basin is listed as the river at highest risk with 46 large dams planned or under construction.¹ However, few of these planned dams are undergoing rigorous cost-benefit analyses or environmental impact assessments. In China and the United States alike, dams are promoted by economic beneficiaries who will not have to deal with the negative impacts created by dams. Even when broader public-interest decision-making is involved, water projects like dams are often planned by engineers who have little experience in examining the harm these projects can do to ecosystems and society. U.S. and Chinese NGOs often represent segments of society who are more fully aware or more directly affected by those impacts. When their perceptions lead to the conclusion that the dam projects should be stopped, they may use a wide range of tools to convince decision-makers and society at large not to build the dams or at a minimum to modify the plans.

In U.S. dam debates, the range of tools available to NGOs runs the gamut of public and private decision-making processes. Years of experience have shown that NGO efforts usually prove successful when strategies include strong public education and the building of a network with non-traditional dam opponents (e.g., environmentalists and sports fishers). In addition, they often find support when they help develop alternative solutions for perceived water resource needs. Without creating strong networks to build political opposition, NGOs may only temporarily halt dam construction. Increasingly NGOs have been helping to build dialogues to diffuse tensions and to create collaborative problem solving. Although China lacks some of the legislative mechanisms afforded to groups in the United States, public education and broad-based alliances have also proven key in expanding the debate on dam construction.

Legislative Strategies of U.S. NGOs to Block Dams

Using the National Wild and Scenic Rivers Act

The U.S. NGO-led efforts to stop the construction of ill-conceived dams have been helped along by some significant legislative initiatives. Most notable is the



San Joaquin Water Project. © American Rivers

National Wild and Scenic Rivers Act, a law passed in 1968 that bans dams on a limited number of rivers individually designated for preservation by a direct act of Congress or by the legislature of the state in which they flow. There are three separate categories of protected rivers—wild, scenic, and recreational—divided by the degree of existing development along their banks. Once designated, all three categories are protected from future dam building.²

This act did not emerge within a vacuum; rather it was the product of NGO advocacy. While the idea of a national river conservation system was first proposed in 1962 by conservationists John and Frank Craighead, national conservation groups including the Wilderness Society, the Izaak Walton League of America and the National Audubon Society worked with congressional champions for years until the Wild and Scenic Rivers Act was enacted in 1968.³ Moreover, once the act was passed, the job of these social groups was not done: the continuing designation of new rivers to the wild and scenic rivers system rests largely on local NGOs concerned about local rivers. Since the federal law was enacted, river conservationists sought to expand the list of federally designated rivers and implement the statute's protections.⁴ Disconnected efforts led some activists to conclude a single-focus organization was needed, which led to the founding of a new national NGO dedicated to protection of wild and scenic rivers, the American Rivers Conservation Council (now American Rivers) in 1973. Over the last 30 years, the federal wild and scenic rivers system has expanded to protect more than 11,300 river miles on 164 U.S. rivers, due largely to active, on-the-

ground efforts by state and local NGOs, often with the assistance of American Rivers.

Other Legislative Strategies

The Wild and Scenic Rivers Act is not the sole arena for NGOs' legislative efforts to prevent dam construction. The 1950s and 60s saw at least two major legislative battles over the construction of dams in the Colorado River Basin, with a national NGO, the Sierra Club, taking the lead. In the first, the Sierra Club brought its own engineering calculations to challenge the Bureau of Reclamation's Colorado River Storage Project, which planned a series of major dams for water supply and hydropower production. Arguing that the power produced would be prohibitively expensive and the vast reservoirs would evaporate more water than they would store, the Sierra Club persuaded members of Congress to fight the authorization and the appropriation of federal funds for construction of these projects.

Although the Colorado River Storage Project was authorized in 1956, the Sierra Club reached a compromise that allowed construction of the Glen Canyon Dam near the Arizona/Utah border, but prevented funding for Echo Park Dam near the confluence of the Green and Yampa rivers in Utah. After the loss at Glen Canyon, the Sierra Club redoubled efforts in a second campaign to stop additional dams in the dramatic canyons along the Colorado River. A major public education campaign in the mid-1960s produced floods of letters to congressional offices, thus preventing authorization of the Marble Gorge and Bridge Canyon Dams within the Grand Canyon.⁵ In 1975, the U.S. Congress expanded the boundaries of the Grand Canyon National Park to protect these areas of the canyon permanently from dam construction.

The Power of the Endangered Species Act

Even when NGOs lose their case in Congress, U.S. NGOs may still oppose a project in court, if the dam construction violates other laws. The most renowned example of such a court strategy was used against the Tellico Dam, one of several dams planned in the Tennessee River Basin by the Tennessee Valley Authority. Opposition centered on the fact that the dam would flood a free-flowing reach of the Little Tennessee (a major recreational resource and trout fishery) while producing only minimal economic benefits. When the national NGO Environmental Defense Fund (EDF) filed a lawsuit in 1973 opposing the dam, it relied on the provisions of the recently enacted

Endangered Species Act, arguing that the dam would wipe out the only known population of a small fish known as the snail darter.⁶ The case made its way to the Supreme Court in 1978 and led to the nation's leading legal decision under the Endangered Species Act. The Court ruled that Congress had intended the law to prioritize species conservation over other purposes, essentially deeming the dam illegal.

While successful in court, EDF eventually lost the Tellico Dam fight because of inadequate public and political support. Congressional supporters of the dam responded to the Supreme Court decision by amending the Endangered Species Act, creating a new process whereby a project that was found to jeopardize the continued existence of an endangered or threatened species could be referred to a designated "Endangered Species Committee" for determination of whether an exemption is warranted.⁷ The Tellico Dam was referred to the committee, which found that even though the dam was 90 percent completed, its benefits would still not outweigh the cost of completion. However, once again the dam supporters returned to Congress, and passed a rider on funding legislation for the dam, exempting it specifically from the Endangered Species Act. The lack of a broad coalition also explains the failure of one of the first Chinese NGO campaigns to attempt blocking a dam—the construction of the Mugecuo Dam in Sichuan Province.

Early Attempts to Push for Greater Transparency in Dam Building in China

The promise of hydropower has led to a marked increase in the number of dams built or proposed in China since the 1970s, such that the country is now home 86,000 dams—22,000 of which are large dams, accounting for 45 percent of large dams in the world.⁸ The construction on China's largest dam—the Three Gorges Dam on the Yangtze River had been debated for decades in China before the government approved the plan in 1992. The goals of the dam were to improve flood control and navigation on the river and provide nearly 11 percent of China's energy needs. The construction of the dam became highly politicized due to the small, but vocal, group of journalists and scientists within China and a major campaign by international NGOs criticizing the damage the huge dam would have on endangered species, relocated villagers, and historical sites. Chinese NGOs were not involved in this debate, for construction began before legislation to permit NGO registration passed in 1994.

Chinese NGOs involvement in dam dialogues began in 2003 when the Sichuan provincial government approved proposals from Chinese energy companies that a hydroelectric dam on the Mugecuo Lake would bring considerable economic benefits for the surrounding poor areas. The plan encountered opposition from environmental groups that predicted disastrous impacts on biodiversity and general livelihood of minority groups. The dam would be situated in the Gongsha National Park and any significant environmental degradation to the area could hurt not only efforts at conservation, but also a nascent eco-tourism industry that could provide a livelihood for rural poor in the region. Additionally, scientific experts added their voice to the debate noting that the dam was planned too close to an active earthquake zone; the creation of a large reservoir could very well trigger earthquakes.⁹

Given that both the local government and industries stood to gain from the dam, the battle to stop construction was uphill from the start. Undeterred, Conservation International Beijing, WWF China, and numerous journalists launched a media campaign, publishing articles in newspapers, organizing workshops and field surveys, sending letters to high-level government officials and lobbying local members of the National People's Congress. The groups expressed concern about this particular dam's impact on the ecosystem, but stressed that they did not oppose all dam building. In addition, the groups involved in the anti-dam campaign attempted to use preexisting laws to their favor, arguing that building a dam in a national park was against the law. Moreover, they criticized the decision-making process, demanding greater information and voice for local residents.

In response, the State Council created a task force composed of staff from State Environment Protection Administration, State Travel Administration and the Huaneng Power Company to investigate the plan. Despite the efforts of the anti-dam campaign, the interests in favor of the dam (who were disproportionately represented in the task force) won over and the dam remains on schedule for construction. Although opposition ultimately failed, Chinese NGOs did gain some valuable insights into how to expand the dialogue on dam building.

Building Powerful Coalitions to Battle Dams

Creating Winning Partnerships in Colorado

As in the China case, U.S. NGOs may also find themselves fighting battles over new dams at the

state or local level. But unlike China, at the state level in America, political fights sometimes involve a direct vote of the electorate. The most common kind of referendum over dams comes up when state governments must seek voter approval to issue taxpayer-backed bonds to finance construction. In 2003, the governor of Colorado proposed a \$2 billion bond referendum, Referendum A, for the construction of water projects. Although the nature of the projects was not defined, it was generally understood that the proceeds would go to construct some form of the "Big Straw" project—a proposal to build new reservoirs in western Colorado to serve the rapidly expanding suburban sprawl around Denver. Conservationist groups, under the banner of the Colorado Environmental Coalition, joined with state taxpayer advocates, western farmers and ranchers, sportsmen and paddlers, to oppose what they called a taxpayer-financed "blank check" for state water developers. In the end, this non-traditional coalition earned an unexpectedly large victory, with the referendum losing in every county and 67 percent of voters statewide in opposition.¹⁰

Colorado's continuing debates over water supply also provide a leading example of conservationists stopping new dam construction through the actions of an administrative agency. The Two Forks Dam, proposed by local Denver water utilities in the late 1980s, would have flooded the Cheesman Canyon, a major recreational area on the South Platte River outside of Denver. While no congressional authorization or funding was required for the project, the Denver Water Board did need a federal permit under section 404 of the Clean Water Act for disposal of dredged and fill material. Section 404(a) requires the U.S. Army Corps of Engineers to serve as the primary permitting authority, but section 404(c) gives the Environmental Protection Agency (EPA) veto authority to declare any particular site off-limits for fill. This authority has been used only a limited number of times, but environmental NGOs in Colorado, led by the EDF's Boulder office, sought a high-profile veto of Two Forks Dam from the EPA Administrator, William Reilly. Knowing that the environmental quality of the site alone would not prevent its development, EDF and others developed alternative proposals, demonstrating that incremental additions to Denver's water supply would be less costly and more efficient. They also worked on a major public education program to reduce the potential political backlash if Administrator Reilly

chose to veto the dam. In 1990, Administrator Reilly issued an administrative veto of the dam permit, ending the threat to Cheesman Canyon. Over the following decades, the Denver Water Board ultimately used many of the alternative water supply solutions the NGOs proposed.

Power of Broad Coalitions in Changing the Dam Debate in China

Like the Colorado case, for dams to be successfully derailed in China, opponents must find a sympathetic ear in influential government organs. The Yangliuhu Dam, planned for construction in Sichuan Province, is one such example. As with other dam projects in China, the Yangliuhu was proposed by the lead beneficiary—a state-owned enterprise of the Sichuan Department of Water Resources Bureau. The advocates suggested that the dam would provide steady water supply for urban use and irrigation with no negative effect on a preexisting downstream hydroelectric dam, the Zhipingpu Dam. What is more, the planners warned that without a new dam, the government stood to



On the Skagit River (pictured), which empties into Puget Sound in Washington State, Seattle City Light worked with American Rivers to develop license conditions that would restore a salmon fishery in the river, moving fish past three dams and improving flows at reasonable cost to power users. © American Rivers

lose 50 million Yuan each year from hydropower generation of Zhipingpu Dam.

Despite significant government support for the dam, it soon encountered significant public opposition. Most of the criticism focused on the potential damage to the 2,220 year-old Dujiangyan Irrigation System, listed as a World Cultural Heritage site in 2001. Scientists, journalists, and public interest groups took their campaign to newspapers, television

and Internet. Public outcry well beyond Sichuan prompted officials in the State Ethics Administration and the municipal National People's Congress representatives to submit letters of protest to the Sichuan Provincial People's Congress. Following an investigation by a task force—led by the Ministry of Construction and the State Ethics Administration—plans for the Yangliuhu Dam were cancelled.

Yangliuhu was the first dam to be successfully suspended in recent history. Although NGOs were not directly involved in this case, the suspension of the dam plans has given Chinese environmentalists insight into the strategies for stopping particularly damaging dams.

Death by 1,000 Cuts

Successful Opposition to the Auburn Dam in California

One major dam construction fight in California shows how NGOs have brought together a broad array of tools to halt dam construction over a long period of time. The Auburn Dam in northern California has been advocated as a project to create an enormous reservoir on the Middle and North Forks of the American River for more than four decades. Opposition to the Auburn Dam took many forms. Local NGOs worked with sympathetic members of California's congressional delegation to designate upstream and downstream portions of the American River as components of the Wild and Scenic River system. The same NGOs also joined the Natural Resources Defense Council (NRDC) in federal court, winning a case preventing construction of certain water supply facilities from Auburn Dam. After an earthquake raised safety concerns at another California dam in 1975, NGO activists also forced reevaluation of the safety of the dam site, which led to further documentation and seismic redesign. The final problem for the dam arose in 1984, when a new federal cost-share policy for water projects under the Reagan administration would have required significant support from Auburn Dam water and power beneficiaries. When these beneficiaries declined to assume the costs, Auburn Dam seemed dead.

In 1986, however, a high water year on the American River and poor water management by the Bureau of Reclamation contributed to flooding and threatened levees along the lower river through Sacramento. The Army Corps of Engineers resurrected the Auburn Dam proposal as a tool to provide additional flood protection for Sacramento, and a new authorization battle began in Congress. Over

the next few years, several federal agencies conducted competing feasibility studies for the Auburn Dam. Ultimately, the Corps brought an authorization for a flood control dam back to Congress. Environmental NGOs joined together with taxpayer advocates in fighting the project based on both environmental and cost concerns, and won a vote on the floor of the House of Representatives preventing reauthorization.¹¹

Congress and the Sacramento Flood Control Agency have moved on to approve alternative flood control measures for the city of Sacramento, while local NGOs have joined with taxpayer advocates and the city of Sacramento in arguing for the construction of the cheaper flood control measures. These local NGOs also worked with the California Attorney General to persuade the Bureau of Reclamation to close the diversion tunnel that had made a portion of the American River impassable since the 1960s. And local cost-sharing policies for federal flood control projects have also risen. Despite all of these actions that doom the construction of the dam, even in 2006 Auburn Dam advocates continue efforts to reauthorize a federal dam at the site.

Nationalizing the Dialogue on the Nujiang Dam in China

While the Mugecuo Lake Dam case represented a failed NGO effort to stop construction of an ill-conceived dam, the ongoing Nujiang Dam case indicates that NGOs may have more ability to successfully broaden the debate around dam building. The Nu River (Nujiang) is unique in that it is one of the last remaining “wild” or un-dammed rivers in China. Although this pristine river system achieved listing as a World Natural Heritage site in 2004, in that same year the Yunnan provincial government began planning a series of 13 hydroelectric dams on the river.

Unlike the Yangliuhu Dam, the campaign launched against the Nujiang Dam was, from the beginning, a product of local- and national-level NGO networking and reporting by environmental journalists. In the fall of 2004, NGO activists in Beijing heard rumors of these planned Nujiang dams and organized a group of environmental journalists to tour the basin. The investigative reports written by this first group of journalists revealed that the construction companies neglected to complete the required environmental impact assessments (EIAs) and ultimately these dams would destroy a beautiful river and create more economic hardships for poor ethnic minority communities in

the basin. As more journalists reported on the danger of the dams, NGOs from around China formed alliances with scientists to undertake workshops, dialogues, field surveys, letter writing campaigns, local farmer visits and education of local communities in the Nujiang basin.¹² The campaign notably supported efforts by China’s State Environmental Protection Administration to push for stronger EIAs and greater public participation in infrastructure projects. The NGO alliance emphasized a desire to promote greater transparency in dam building decision-making so as to prevent damaging projects from moving forward and causing irreparable damage to the ecosystem and local people. By early 2005, the pressure against the dams culminated in Premier Wen Jiabao ordering a halt to planning the dams due to the insufficient EIAs and concern the dam debate was causing too much social instability.¹³

Like the Auburn Dam case above, local dam advocates are still pushing for at least a scaled-back version of the Nujiang dams. In late summer 2005 the central government agencies reviewed the revised EIA but did not disclose it as required by the EIA law. Thus, on 31 August 2005, a broad coalition of Chinese groups (which included 61 NGOs and 99 researchers and government officials) sent an open letter to the government urging public disclosure of the EIA for the Nujiang dams.¹⁴ Although the debate is ongoing and NGOs have even threatened a court case, the NGO efforts to push for greater openness in debating the dams is a testament to the increased freedoms and capacity of Chinese environmentalists.

The Auburn and Nujiang dam cases represent a catalogue of the steps that environmental NGOs have used to stop or slow down dam building. While U.S. NGOs have relied more on legislative and court battles than their Chinese counterparts, in both countries NGOs have cultivated dam opponents within government and sought to create broad-based alliances. Both campaigns have required staying power, as no single step thus far has driven the final stake into the heart of the dam proposal. These all fit into the broad array of tools necessary for dam fighting.

FIXING EXISTING PROBLEMS— RIVER RESTORATION PROJECTS

River restoration can involve a broad range of activities—dam removal, dam re-operation, pollution

SPOTLIGHT ON NGO ACTIVISM IN CHINA

Chengdu Urban Rivers Association

By Betsy Damon

One day in late May 2006, I hopped into a mini van with eight Chinese colleagues for the 50-minute trip from Chengdu's city center to the peri-urban farming village of Ping Li. Soon we found ourselves far from the bustling high rises, driving through a bucolic landscape of small farms among bright yellow rape fields, women crouched over small streams scrubbing their washing, tractors hauling hay, and most refreshingly, clean air.

Unwinding our bodies from the mini van we were greeted by local farmers who took us on a tour of the methane gas collection units being installed on each farm. The farmers were proudly displaying the larger enclosures they were building to raise more pigs and chickens. More manure for the gas means more pigs for the market and crucially less polluting runoff into the local rivers. This is but one initiative that the village is doing in partnership with the Chengdu Urban Rivers Association and other Chinese and U.S. nongovernmental organizations (NGOs) to turn the village into a model to train nearby villages to better protect the local watershed.

Next to a small lake, the village and the NGOs are building a training center to hold classes in organic and sustainable farming practices and demonstrate watershed protection techniques and technologies. We walked around the lake with our hosts, discussing stream bank protection and ended up in a large courtyard where tables full of food were waiting. On this day, we were received with an air of excitement and genuine smiles, quite a contrast to our first visit five years ago when our proposal to create a model watershed protection village was met with distant politeness and skepticism. After five years, this project has generated enough local, county, and provincial support to begin. While the installation of methane collectors has helped gain community support, the next steps to implement watershed protection and extensive education programs will demand considerable support from many sectors.



CURA and Keepers of the Water talking over tea with farmers about creating a model watershed protection village. © Betsy Damon

The background to this project and the relationships making it possible actually began eleven years ago. As part of a municipal five-year campaign (1992-1998) to clean the rivers of Chengdu, the U.S. NGO Keepers of the Water, which I founded, was invited to create the first public art project in China for water. This multi-media international art event on the Funan River in Chengdu led the municipal government to invite me to design a park to teach people about natural water cleaning systems. This park became the Living Water Garden, a recreational park that hosts a functioning seven-step water cleaning process that Chinese mayors, designers, developers, and citizens throughout China have come to enjoy and study.

The Chengdu municipal leadership realized that the pollution control and awareness raising activities in the five-year campaign were not sufficient to improve the city's rivers. Thus, the municipality created the Chengdu Urban Rivers Association (CURA, which is now an independent NGO) to investigate ways to address industrial and agricultural pollution in the peri-urban areas and devise strategies to restore and preserve the municipality's watershed. In 2001, I was invited to be a consultant to CURA. Keepers of the Water subsequently gave CURA small grants to conduct research and

design a plan for a model training village that would integrate sustainable watershed protection practices with economic development.

One of these CURA grants went to Duncan Cheung, then a sophomore from Tufts University, who wanted to work in the field before applying to the Yale School of Forestry. Duncan took a year off of school to conduct research and help launch the model village project. After nine months with a team of 12 volunteers he completed the much needed research on the main threats to Yi Ping village's watershed. His research and proposal for designing and implementing the model village were met with praise and financial support from the government and business communities in Chengdu. This funding is enabling CURA, Keepers of the Water, and other partners—such as the Jane Goodall Institute (JGI)-China; the regional student organization GreenSOS; local environmental protection bureaus, and some international experts—to begin carrying out research and design trainings on a broad range of issues—watershed mapping, stream bank protection, biological wastewater treatment, recycling and conservation, biogas, and organic farming. The first focus of the education program is watershed protection and remediation, which will begin with training the local farmers who will then

reach out to rural students, farmers, businesses, and local governments in the neighboring ten villages.

Many environmental efforts in China fail because they are too narrowly focused and lack sufficient cooperation among the various sectors. After ten years of involvement in Chengdu, Keepers of the Waters has built many coalitions across government, NGO, and community sectors in the municipality. This network has been vital to facilitating the start of this rural watershed protection village program. However, ultimately CURA is the leader of this program, beginning with Duncan and the first group of volunteers who developed the vision and continuing with the current volunteers and CURA director Tian Jun, who are navigating the bureaucracy to keep the program moving forward. CURA's networks with international and domestic NGOs and local governments will help create a model village program that demonstrates how development and watershed protection can go hand in hand.

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Almost 300,000 people from thirteen different ethnic groups live in the Three Parallel Rivers (Nu, Lancang, and Jinsha) World Heritage Area. Chinese NGOs are working to ensure communities in this region are given a voice in dam-building decision-making. © Wang Yongchen.

control and habitat restoration. In the United States, the tools used by NGOs to address conflicts over river restoration are similar to those used in conflicts over dam building, but the diversity of restoration projects makes river restoration activities by NGOs even more complex. As with dam-building conflicts, NGOs may work on river restoration at a federal, state, or local level, and may use all aspects of government and private decision-making. And again, the chances of success improve as NGOs ally themselves with other interests, help to find alternative methods of reaching water management goals advocated by developers, and build political support for restoration efforts.

Glen Canyon Dam

One straightforward way to achieve river restoration in the legislative arena is simply to change the statutory requirements for how a river is managed. Designation under the Wild and Scenic Rivers Act can protect a river from new dams, but other legislative fixes are necessary to require restoration measures. In the early 1980s, river rafters and

conservationists discovered that the recently completed Glen Canyon Dam upstream of Grand Canyon National Park was having detrimental downstream impacts. The dam and reservoir served to settle out the natural sediment and the depth of the reservoir also cooled the warm waters of the Colorado that supported native fish. As the water warmed it scoured the riverbanks, taking away sediment rather than dropping its load of sand. The scouring effect was exacerbated by the Bureau of Reclamation's effort to maximize the value of Glen Canyon Dam's hydropower generation by operating the dam in "peaking" mode—raising and lowering the river flow daily to correspond to daily fluctuations in power demand.

The impacts of Glen Canyon Dam were initially addressed in 1989 when the Department of the Interior produced the *Glen Canyon Environmental Studies*, in response to an earlier Secretarial order. Scientific data over the next several years demonstrated that the dam was having negative impacts on aquatic and riparian ecosystems and recreation in the Grand Canyon. But administrative will to change operations was lacking; agencies were influenced by a powerful association of utilities benefiting from dam operations, and cited existing laws that they asserted restricted them from operating the dam to protect ecosystems. In response, the National Wildlife Federation and the newly formed Grand Canyon Trust joined with Grand Canyon river outfitters and congressional champions to introduce the Grand Canyon Protection Act. The law was enacted in 1992, requiring explicitly for the first time that Glen Canyon Dam be operated in a manner to protect the Grand Canyon.¹⁵ It also required a full environmental impact statement (EIS) on the dam's operations—something that had not been required previously because dam construction began before the National Environmental Policy Act (NEPA) was enacted. Currently, scientific study continues as experiments with artificial flooding and other flow changes have been tried to improve canyon conditions for native fish, wildlife and recreation.

Complex River Restoration Work

Efforts to restore the complex river ecosystems of California's Central Valley and San Francisco Bay and Delta have proven far more difficult than the Glen Canyon case in that they involve many interests and multiple conflicts over appropriate solutions. This case embodies many of the same

complexities faced by Chinese and international NGOs working to promote restoration on the Yangtze River, discussed below.

California's river restoration problems center around two enormous water projects designed to bring water from the precipitation-rich north to the major agricultural areas and urban centers of the drier south. The natural river system includes two major rivers in the Central Valley, the Sacramento in the north and the San Joaquin in the south. The San Joaquin River is dewatered for many miles downstream of Friant Dam, and two large canals bring water "upstream" from the Delta south to the farms and cities of southern California.

The impacts of this huge plumbing system have been severe along the trunks of the rivers, but even more severe in the Sacramento-San Joaquin Delta and San Francisco Bay. Insufficient freshwater outflows confuse migratory fish species traveling through the bay and delta and lead to saltwater intrusion that harms the estuarine ecosystem. For many years, a large coalition of NGOs has worked through litigation, administrative action, private negotiation and legislation to try to restore the affected ecosystems. The first legislative effort came in 1992, with the passage of the Central Valley Project Improvement Act, a law that changed the governing standards for the federal Central Valley Project to require fish and wildlife protection as a major purpose, and created a fund from fees on water users to restore fish and wildlife resources.¹⁶ In passing this law, groups like the NRDC, EDF, and Save The Bay worked with Congressman George Miller, representing residents of the Delta and East Bay areas, to encourage urban water users to support a reauthorization of the water transfer project that could work to balance water demand in southern California and fish and wildlife restoration needs.

As California sought more imaginative ways to deal with its water and conservation needs, however, an even larger alliance began to form. In 1996, an alliance of water districts and conservation groups brought to Congress a larger restoration and water management project, CALFED. The proposal involved billions of dollars of new investment by the state and federal governments to pay for ecosystem restoration and water management measures designed to improve water deliveries at the same time as San Francisco Bay and Sacramento-San Joaquin Delta conditions. A three-year federal authorization for CALFED passed in 1996, although reauthorization of this restoration project has proved quite

contentious, with water development interests attempting to exert political power to require a new water supply project. The restoration and management projects continued to receive funding through 2003, but because the large state, federal, and NGO alliance broke down, this massive restoration project has received little funding since 2004.

Most recently, however, a remarkable negotiation over the operations of the Friant Dam has produced the latest restoration success for the San Joaquin River. NRDC has opposed renewal of water supply contracts for irrigation water supplied from Friant Dam ever since those contracts expired 18 years ago, due to the effect of water withdrawals on fish and downstream water quality. Through political action and state court litigation, NRDC prevented the finalization of the renewed contracts and forced irrigators into negotiations over how the project might be operated to return water to the river, which had been dewatered below the dam for 60 years. In September 2006, the parties announced a settlement agreed to by the state and federal governments, which will restore water to the depths of the 1940s by 2009. All parties are now seeking legislative confirmation of their agreement through the U.S. Congress.

Re-licensing of Dams as an Opportunity for Removal

In some cases, U.S. NGOs can also work with federal administrative agencies to restore rivers affected by nonfederal projects. For example, the Federal Energy Regulatory Commission (FERC) regulates nonfederal hydropower projects nationwide. Although many projects were licensed long before modern environmental standards came into play, the Federal Power Act requires that these projects be re-licensed every 30 to 50 years, creating an opportunity to reevaluate the projects' impacts on rivers. A major period of re-licensing for hundreds of projects began in 1993 and will continue through 2015. NGOs can participate in FERC proceedings as full parties, and FERC has created incentives for licensees to negotiate with all interests affected by river management to reduce conflict in hydropower licensing.

The Federal Power Act requires that FERC give equal consideration to fish and wildlife as well as hydropower production, and requires fish passage as mandated by federal fishery agencies. By participating in utilities' re-licensing processes, NGOs have been able to insist that the environmental

BOX 1. International NGO River Restoration Work in China

WWF-CHINA. WWF-China has several major integrated river basin management initiatives on the Yangtze River, which include demonstration projects to improve flood control by restoring wetlands and lakes and increasing public participation in water management through community education and NGO capacity building activities. In 2005, WWF established a small grants program for local NGOs and communities to fund projects aimed at promoting the conservation of Yangtze aquatic species.

CONSERVATION INTERNATIONAL. Since 2005, Conservation International (CI) has been working with The Nature Conservancy and China's State Forestry Administration to carry out a pilot project in Lijiang, Yunnan focused on watershed protection and reforestation. The project aims to set up a program in which downstream water users in the city of Lijiang compensate upstream farmers for protecting the watershed. CI also is collaborating with the Environment and Natural Resource Protection Committee of China's National People's Congress in research and projects to help inform the creation of payment for environmental services legislation in China.

THE NATURE CONSERVANCY. In partnership with Chinese government agencies and academic institutions, in 2006 The Nature Conservancy has catalyzed an assessment of sustainable energy options for an integrated power grid in which hydropower development is designed to the greatest extent possible to conserve freshwater ecosystems and sustain local livelihoods.

OXFAM HONG KONG. Since 2004, Oxfam Hong Kong has partnered with Lanzhou University's Resource and Environmental Sciences College to conduct a rights-based water pollution assessment and governance project on the Hongyashan reservoir in the Shiyang River Basin. The project aims to: (1) assess the sources and process of pollution to provide a scientific basis for an integrated management approach, (2) promote dialogue between community members and the government on pollution control, and (3) establish strategies for river basin water resource and pollution management.

standards of the Federal Power Act be met, either through negotiation or through adversarial processes in front of FERC.

Many utilities are pleased to work through negotiating their licenses, to reduce the costs of conflict over re-licensing and create more certainty regarding the content of their licenses. For example, on the Skagit River, which empties into Puget Sound in Washington State, Seattle City Light worked with American Rivers to develop license conditions that would restore a salmon fishery in the river, moving fish past three dams and improving flows at a reasonable cost to power users. The utility was so proud of the outcome that it penned an op-ed in the *Seattle Times*, touting the successful return of the fish and the minimal cost to utility customers.¹⁷

Litigation and Negotiation Strategies in the United States

Litigation can also provide an important tool for U.S. NGOs to compel river restoration measures. There are numerous examples in which a broad coalition

of environmental NGOs has used the Endangered Species Act to take the Army Corps of Engineers or the Bureau of Reclamation to court over dam projects. Such cases are costly, time-consuming and do not always lead to lasting solutions. (*Editor's Note: See Eng and Ma article in this report for more details on the failure of litigation to resolve river restoration cases.*)

One NGO that has taken a different approach to negotiations for river restoration is the Oregon Water Trust, an organization that was founded to take advantage of Oregon's unique Instream Water Rights Act, allowing the state to protect the level of water flow necessary to maintain and restore river ecosystems. Since these water rights can be purchased from other water users and donated to the state for permanent protections, the Oregon Water Trust's program involves raising money and negotiating with existing water users, sometimes working through local watershed councils, to obtain the water rights necessary to protect key watersheds. So far, the Trust has identified five priority river basins in the state, based

BOX 2. Chinese NGOs and River Protection Activism

CHINA RIVERS NETWORK. Based in Beijing, the China Rivers Network is a loose coalition of Chinese environmental NGOs and individuals who care about the preservation of Chinese rivers. The coalition formed in 2004 during the initial months of the Nujiang Dam debate to act as an information-sharing platform for pushing transparency in the EIA process regarding dams. This volunteer network continues to act as a liaison organization on water issues in the NGO sector.

GANJIANG ENVIRONMENTAL ASSOCIATION. In response to the rapid degradation of the Gan River (Ganjiang) in Jiangxi Province, in 2003 concerned environmental experts created this NGO, which has been: (1) conducting water quality research, (2) producing publications on water resource protection, (3) sponsoring lectures at schools, and (4) shooting a documentary on environmental protection needs in the basin.

GREEN HANJIANG. The main activities of this NGO, registered in September 2002 in Hubei Province, include doing research on environmental hotspots in the Han River Basin, communicating public concerns to local government agencies, acting as watchdog against local pollution, and educating rural residents on the importance of river protection. This NGO also has advocated for greater compensation for citizens who will be displaced by the construction of the South-North Water Transfer project.

GREEN RIVER. This NGO has worked since 1994 to protect the ecologically fragile Yangtze headwaters region through activities at two ecological research centers. In a new initiative, Green River is developing a program to help promote ecologically sustainable tourism in one Tibetan village in the Minjiang Basin (a tributary of the Yangtze).

GREEN WATERSHED. This NGO focuses on integrated watershed management in the Lancang-Mekong River Basin in Yunnan Province. With the assistance of Oxfam-America, Green Watershed established—and now facilitates—the Lashi Watershed Management Committee. This committee runs dialogues among a broad range of government and community stakeholders to help them evaluate watershed development and protection options. In order to promote broader multi-stakeholder participation in the decision-making surrounding dams in southwest China, Green Watershed set up some exchanges bringing villagers from the Nujiang basin to visit to villages at the Manwan and Xiaowan dams. This village-to-village visit enabled the Nujiang basin villagers to see first-hand the potential detrimental effects of dam building on remote rural communities.

HUAI RIVER PROTECTORS. This NGO began its work using photo exhibitions to help promote information on the severity of human health and ecological damage stemming from the extremely polluted Huai River. Huai River Protectors also has conducted health surveys in over 100 villages in the river basin and discovered abnormally high cancer rates, which appear to be caused by the water pollution. Chinese news media have reported on these health surveys and assistance activities in these cancer villages. Such news reports have pushed local governments to invest into drilling deep wells to supply safe and clean water for villagers.

on the ecological conditions, community interest and other factors indicating a probability of success. The Trust has completed numerous deals, sometimes compiling significant water rights out of a dozen agreements with local farmers willing to contribute a little water towards local stream restoration and fisheries.

Local negotiation can not only produce better flows to restore river health, but can also sometimes lead to selective removal of dams that no longer serve their

original purpose, or where the benefits of restoration outweigh dam usefulness. Public education is often a key component of these efforts, as local citizens are often accustomed to reservoir recreation, or simply to the “look” of the dam and impounded river. The River Alliance of Wisconsin is one state NGO that has taken a lead in dam removal, negotiating, for example the Waterworks Dam on the Baraboo River, an unused dam owned by the City of Baraboo. When the city realized it would cost less to remove the dam than

to resolve significant dam safety problems, the city worked with River Alliance of Wisconsin to research dam removal impacts and calm local resistance to the loss of the dam. The dam was removed in 1998.¹⁸

River Restoration in China

China's experience with dam removal and river restoration is considerably shorter than that in the United States. The largest impediments to the protection and restoration of river ecosystems are the continuing building of dams, past destruction of wetlands and lakes through landfill for farming, and growing water pollution. Unlike the United States, China is still in the heyday of dam building, driven by government concerns for energy and economic development. To help meet the country's predicted energy demands of 930 million KW by 2020, hydropower is targeted to increase by 10 million KW each year for the next fifteen. Put differently, the equivalent to one Three Gorges Dam must be finished each year to meet these energy targets.¹⁹ In January 2005, the State Environmental Protection Administration halted 30 key projects, mostly hydropower plants, as they had not completed required EIAs, which indicates that the new hydropower development may be facing stricter environmental inspections in the future.²⁰

Dam Removal—A Future Agenda?

Paralleling the 200+ dams planned by local governments in southwest China, has been acknowledgement by central officials in the Ministry of Water Resources of some negative impacts of dam building—resettlement difficulties, sediment in water ways, damage to fisheries, river ecosystems, and danger of dam failure among older dams.²¹ Thus, policymakers and the public are now focusing more attention on improving how dams are planned and carried out, rather than the question of their removal. However, the issue of removing some dams is beginning to be raised in China, since many that were built in the 1950s are reaching the end of their life cycle. Dam maintenance costs and the risk of failure are rising, which might convince both public and private interests to reevaluate their existing support for dams and move toward the removal of some dams. The U.S. NGO experience in this area should provide useful insights for such future movements in China.

Perhaps most ripe for this appraisal is the forty-year old Sanmenxia Dam, situated on the border of Henan and Shaanxi provinces. The first major

dam built in the Yellow River Basin, Sanmenxia has been the subject of heated debate since its construction. But opposition to the dam reached a head in 2003 when the Wei River was beset by large-scale flooding. Fifteen members of the National People's Congress from Shaanxi Province publicly expressed suspicion that raised water levels from the Sanmenxia Dam were the primary cause of flooding. One noted hydropower expert, Zhang Guangdou, went so far as to declare the dam an absolute "mistake." Even one high-level official in the Ministry of Water Resources, Vice Minister Suo Lisheng, considered reducing the water level and lowering the dam's energy production.

As evidence of the great interests pushing against the destruction of preexisting dams, the Yellow River Conservancy Commission rejected calls for diminished capacity at Sanmenxia, suggesting that removing the dam would mean an annual loss of 1 billion W/hr of power and \$200 million income from electricity sales, crucial for the general operating costs of the commission. Apart from dam removal, Chinese NGOs are also carrying out projects—often with international NGOs—to help in restore wetlands and flood control lakes or address pollution that is destroying river ecosystems.

NGO Activism in River Restoration

Over the past few years, international NGOs have begun to do more work in the area of river basin protection and management. These international NGO projects have been building networks that bring together (often for the first time) central, provincial, and local government agencies, research centers, and Chinese NGOs to work on river restoration and protection issues. Such projects are creating new lines of communication and increasing stakeholder participation around water protection in China, which lays the foundation for better management and protection of China's stressed river ecosystems. International NGOs—many of which with strong local offices (e.g., WWF-China and Conservation International)—also work with central policymakers to strengthen legislation aimed at protecting river ecosystems. (See Box 1).

River protection and restoration—sometimes linked to dams—have become a growing area for Chinese NGO activism. For example, Green Volunteers League of Chongqing has been working with the municipal government and citizens in Chongqing to mitigate some of the potential pollution problems in the Three Gorges Dam reservoir.

The group is concerned that the reservoir will be turned into a dumping ground for the untreated wastewater and agricultural runoff of more than 15 million people living in Chongqing municipality. Key to the success of the Green Volunteers League has been their efforts to collaborate with local government agencies and push for greater citizen input into matters of public health and welfare linked to the reservoir.²² (See Box 2 for more examples).

CONCLUSION

The differences between the experiences of U.S. and Chinese NGOs are not surprising, considering their very different histories and the legal structures in which they operate. That being said, the parallels between their strategies for river protection and restoration are striking. In both nations, environmental groups focused first on preventing damaging new projects from being constructed, but see a much larger potential in advocating restoration of already-degraded rivers. Both U.S. and Chinese NGOs have learned to build broad coalitions, create public awareness, and enlist assistance from interested government officials to achieve their goals. And in both countries NGOs have recognized that river protection and restoration require long-term commitment to overcome entrenched special interests.

At the same time, the community of river protection and restoration NGOs in the United States is simply larger, with the longer history of NGO participation in public life driving a huge amount of citizen involvement in river issues. The literally thousands of organizations dedicated to river and watershed conservation around the United States range from national groups like American Rivers to statewide groups like River Alliance of Wisconsin to the very local Friends of Sligo Creek. Thus, the U.S. NGOs have engaged in a much larger number of river conservation efforts and had many more setbacks and successes from which to learn. But stories of river protection and restoration success can be told in both nations, and U.S. and Chinese NGOs can both continue to learn from each other's experiences.

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NOTES

1. WWF & World Resource Institute, 2004, *River at Risk*, Gland, Switzerland.
2. Rivers on federal lands found eligible for inclusion in the wild and scenic rivers system are protected while Congress considers whether to designate them.
3. Anne Watanabe. (1988). "Two Decades of River Protection: A Report on the National Wild and Scenic Rivers System Past, Present and Future," (November 18). Unpublished paper on file at American Rivers.
4. While the federal law was under consideration, local activists worked to develop similar statewide river protection programs. The first such system was established in Wisconsin in 1965. Thirty more states have followed suit. Although provisions vary among states, each provides some protection against new dam construction on protected rivers.
5. Marc Reisner. (1986). *Cadillac Desert*. New York: Penguin Books.
6. *Cadillac Desert*, pp. 335-340.
7. 16 U.S.C. § 1536(e)-(o).
8. World Commission on Dams. (2000). *Dams and Development*. London: Earthscan Publishers.
9. "Destroying a National Treasure in the Name of Progress." (2003, August 16). *South China Morning Post*.
10. Jones, Else. (2003). "Executive Director's Corner." *The Colorado Environmental Report*, Fall, p. 3; Bender, Michael C. (2004, December 31). "2003 year in review: Top ten stories: No. 6: All 64 counties vote against water measure." *The Daily Sentinel*.
11. Roll Call. (1992, September 23).
12. Jim Yardley. (March 10, 2004). "Dam building threatens China's grand canyon," *The New York Times*.
13. Hu Kanping with Yu Xiaogang. (2005). "Bridge Over Troubled Waters: The Role of the News Media in Promoting Public Participation in River Basin management and Environmental Protection in China." In

Jennifer L. Turner and Kenji Otsuka (Ed.), *Promoting sustainable river basin governance: Crafting Japan-U.S. water partnerships in China*. (pp. 125-140). IDE Spot Survey No. 28. Chiba, Japan: Institute of Developing Economies/IDE-Jetro.

14. Background information and translation of NGO letter demanding public disclosure of the EIA are available on the International Rivers Network webpage: http://www.irn.org/programs/nujiang/index.php?id=050903disclose_pr.html.

15. Title 18, Reclamation Projects Authorization and Adjustment Act, P.L. 102-575 (1992).

16. Title 34, Reclamation Projects Authorization and Adjustment Act, P.L. 102-575 (1992)

17. Nancy Glaser. (2003, February 9). "Fish power: Skagit River salmon are back in huge numbers," *The Seattle Times*.

18. American Rivers, Friends of the Earth and Trout Unlimited. (1999, December). "Dam Removal Success Stories: Restoring Rivers through Selective Removal of Dams that Don't Make Sense."

19. Wang Shucheng. (2004). "On dams and ecology" Presented at the Eighth National Member Conference of the China Water Resource Society [in Chinese].

20. *China News Agency*. (2005, January 18). "SEPA Declared to Stop 30 Illegal Launched Projects."

21. Wang Shucheng. (2004).

22. Pomfret, John. (2003, June 18). "Three Gorges Dam spurs environmentalist's fight." *The Washington Post*.

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SPECIAL REPORT BOX

Interbasin Transfers as a Water Conflict Resolution Mechanism: The Yellow River/Hai River Basin Transfers and the San Juan-Chama Project

By Jay F. Stein and Xuejun Wang

In China and the western United States, interbasin water transfers have aimed to resolve conflicts over water shortages facing municipalities and agricultural areas. This paper compares interbasin transfers in the two countries as a conflict resolution mechanism. We examine the water transfers from the Yellow River to the Hai River Basin, particularly emergency supplies for Tianjin, and the importation of Colorado River water into the Rio Grande for the San Juan-Chama transfer project for municipal and agricultural supply in New Mexico, principally for Albuquerque. Clearly, differing political and legal regimes in the United States and China have led to the creation of distinctive approaches to interbasin water transfers. As a result of the transfers to Tianjin and Albuquerque, initial conflicts over shortages were resolved. But each sparked new conflicts in the basin of origin (Yellow River Basin) or the receiving basin (Rio Grande Basin).

The driving force behind interbasin transfers in both countries has been the need to resolve conflicts arising from water shortage, usually resulting from municipal requirements. Tianjin is the third largest city in China and has suffered from serious water shortages for over a decade. Transfers from the Yellow River have rescued Tianjin from severe drought periods. In the case of Albuquerque, the use of interbasin San Juan-Chama water is essential for stabilizing a conjunctively managed system of



Fishers paddling on the highly polluted Lake Dianchi. One contentious proposal to mitigate the lake's severe eutrophication is to dam the Tiger Leaping Gorge in the upper reaches of the Yangtze and then build a major transfer project from the reservoir water to Lake Dianchi. Without a transparent decision-making process that gives voice to the citizens in Tiger Leaping Gorge, this water diversion could spark conflicts bigger than those occurring in the Yellow River transfers. © Michael Klossen:

ground and surface water to supply the city and to ensure important conservation and environmental benefits. In both countries the inter-provincial or interstate nature of the transfers has required the ongoing involvement of the national government. The U.S. Congress was involved in the enactment of interstate compacts setting up the San Juan-Chama transfer project. The Chinese Ministry of Water Resources adjusts transfer allocations every year, making the interbasin transfer very flexible to changing needs in the receiving basin. The United States, on the other hand, has emphasized long-term planning in designing interbasin transfers at the expense of flexibility, with mixed results as subsequent legislation—most notably the Endangered Species Act—can upset settled allocations under a compact.

The American system has been more adept at addressing issues and conflicts that have emerged in the implementation of interbasin transfers through the judicial and related settlement processes. In China, because the central government makes allocations for transfers, direct involvement by stakeholders has been limited. While the Chinese transfers have permitted great flexibility in addressing conflict and water shortage on a yearly basis, this flexibility can create inequities—with certain cities receiving more water or ecological flows being neglected in the basin of origin.

China lacks both an Endangered Species Act to check any species threatened by a transfer project and a sufficiently strong environmental impact assessment system to empower stakeholders in the basin of origin. Moreover, in China there are no formal mechanisms for parties hurt by transfers to demand compensation or changes in such

infrastructure projects. While U.S. water transfer compacts intend to promote permanency, they do not eliminate conflict from subsequent competition for limited water supplies. However, the American system does provide a mechanism for resolving the conflict in the courts or through related settlement processes. The adoption of a similar legal process in China would help in managing conflicts as they arise in interbasin water transfers.

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River Basin Commissions as a Mechanism for Mitigating and Resolving Conflicts

By Irene B. Brooks and Liu Hongxia

The United States and China both face growing water conflicts over dams, water shortages, and pollution. In the Western U.S., states still rely primarily on compacts and, more often, litigation to resolve water conflicts. On the opposite side of the country, states have traditionally dealt with water disputes through the establishment of river basin commissions. These commissions—such as those in the Delaware and Susquehanna river basins—have proven particularly adept at the early identification of pressing issues and include a key role for public participation in the examination and resolution of watershed concerns. While these two commissions in the United States may be unique in the decentralized authority the Congress has granted them, their structure and abilities to resolve water quality, flood mitigation, allocation, and other water use conflicts offer valuable insights on ways to improve river basin management within and beyond the United States.

Although China boasts fewer institutional mechanisms to prevent and resolve water-based conflicts, the Chinese government has utilized highly centralized river basin commissions to oversee water management in its seven largest river basins (Yellow, Yangtze, Huai, Hui, Song, Liao, and Pearl). With the passage of an amended National Water Law, these commissions have been granted more authority to allocate water and deal with the explosion of water conflicts and problems plaguing the country's rivers. Only the Yellow River Conservancy Commission has undertaken some major reforms in its operations to enhance its ability to control the serious water shortage problems in the basin that have generated considerable conflicts.

This paper examines the organizational history, structure, and functions of the Delaware,

Susquehanna, and the Yellow River basin commissions, with an eye towards valuable lessons in how such commissions can resolve or prevent conflicts. In light of the growing transboundary water disputes facing China, we conclude the paper with a brief examination of the International Joint Commission, a highly effective model to prevent and resolve cross-boundary water problems.

DOMESTIC RIVER BASIN COMMISSIONS

Delaware River Basin Commission

The main stem of the Delaware River is 330 miles long and forms political boundaries for New Jersey on the east, Pennsylvania on the west, touching the western edge of Delaware before reaching the Atlantic Ocean. Heavy use of the river by the basin's 15 million human inhabitants (e.g., boating, fishing, navigation, and fresh water supply) has burdened its ecosystem. By the mid 20th century, pollution in the river was so severe a portion of the water was devoid of any dissolved oxygen. While ecological degradation has caused great concern, it was the issue of water supply that ultimately changed how the four states share the river.

New York City (NYC), which lies outside of the basin, built a series of structures in the headwaters of the Delaware using a gravity fed mountain reservoir system to supplement their supply from the Hudson River. The city was taking up to 70 percent of the water from three tributaries located just within the New York State's border, effecting downstream cities like Philadelphia, Trenton and Wilmington that depend on the Delaware for their water supply.

As a result, in 1931 New Jersey and Pennsylvania sued New York State and NYC in the U.S. Supreme

Court for equitable apportionment of water from the Delaware River. While this litigation resolved the immediate dispute, it failed to establish a framework for long-range planning and management. New York City's desire for yet more water from the Delaware system became more pressing. In 1952 the city petitioned the Supreme Court to amend its 1931 ruling to allow a larger diversion. Other parties within the basin objected and after hearings before a Court-appointed Special Master, a proposed settlement was crafted allowing NYC to increase its diversion along with increased compensating releases to be made from the its three existing and proposed Delaware Basin reservoirs. Although the immediate dispute was once again resolved, the parties failed to establish a framework for long-range planning and management. In the end it was the disastrous result of a crisis in the form of hurricanes Connie and Diane and uncontrolled and very visible pollution that spurred the parties towards a new course of action. To more effectively deal with or even avert disaster, and avoid future litigation, the parties chose to adopt an interstate compact in 1961.

Compacts between states are somewhat like treaties between nations. They have the force and effect of statutory law and take precedence over conflicting state laws, regardless of when those laws are enacted. However, unlike treaties, compacts are not dependent solely upon the good will of the parties. Once enacted, compacts may not be unilaterally renounced by a member state, except as provided by the compacts themselves. Moreover, Congress and the courts can compel compliance with the terms of interstate compacts. That is why compacts are considered the most effective means of ensuring interstate cooperation.

The 1961 compact created a new institution, the Delaware River Basin Commission (DRBC), composed of the basin state governors and a presidential appointee. With few exceptions, a vote of the majority bound all. DRBC utilizes physical boundaries rather than political boundaries and has the ability to examine cumulative impacts within a watershed. The parties to the commission must plan and manage as a unit and share the burden of costs equally. The commission has the ability to consider all facets of water management in an integrated manner, recognizing the need to link surface water and ground water, quantity and quality, land-water and air-water relationships. The commission is further empowered to allocate water among the

signatory states, providing the allocation would not constitute a prior appropriation of water or confer any superiority of rights.

Public participation in basin planning and project development has moved from tangential involvement to more key roles in which the public is included in the entire process of planning–development and implementation. DRBC has an open and transparent process, and includes the public by offering a seat at the table to all sectors. Outreach programs are designed to educate the public about their environment. The commission assists local municipalities and watershed associations by helping them build capacity to manage local water resources in a way that supports basin-wide planning.

Susquehanna River Basin Commission

DRBC's success provided the framework for the establishment of other basin commissions in the eastern United States, including the Susquehanna River Basin Commission (SRBC). The Susquehanna River stretches 444 miles, beginning in New York, flowing to Maryland, draining into the Chesapeake Bay and then to the Atlantic Ocean. The river basin borders the major population centers of the east coast, and although relatively undeveloped, has experienced problems of water pollution and over usage. The basin is one of the most flood prone areas in the United States, with major flooding occurring every 20 years. Home to 4.5 million people, the basin supports a variety of uses including: hydropower, agriculture, industry, manufacturing, fishing, recreational boating and tourism—all competing for this finite resource.

Because of the Susquehanna River's complexity and its penchant for flooding, there was a great need to coordinate the efforts of the three states and the agencies of the federal government, as well as a need to establish a management system to oversee the use of the water and related natural resources of the Susquehanna. These needs led to the drafting of the Susquehanna River Basin Compact. In 1971, the SRBC was formed to coordinate the water resources efforts of New York, Pennsylvania, Maryland and the federal government. The President of the United States appoints the federal member. The State Commissioners are the governors or their designees. Each of the four commissioners has a single vote and meets periodically to act on applications for projects using water, adopt regulations, and direct planning and management activities affecting the basin's water resources.

DRBC and SRBC Water Conflict Resolution Functions

As federal interstate compact commissions, DRBC and SRBC have helped prevent water conflicts through the project review processes. When conflicts do emerge, both commissions have played an important role as dispute resolution forums.

- *Project Review Process.* The two commissions make a significant contribution to the resolution or avoidance of conflicts among private water users. Through the project review process, the commissions review and approve large water uses, often inserting conditions in approvals that are designed to prevent future conflicts with other water users. Both commissions value and encourage strong public participation throughout the project review processes. The expertise and on-the-ground experience that is brought to the table through public advisory committees and task forces add very important perspectives to the decision-making process.
- *Dispute Resolution Forums.* The commissions act as administrative forums where member jurisdictions can come together in a non-judicial setting to resolve inter-jurisdictional differences. The commissions, acting in effect as the agents of the U.S. Congress, have the power to arbitrate disputes among members and to allocate the waters among them. Without this administrative forum, there are really only two alternatives for the settlement of interstate disputes over water: (1) ask Congress to make such allocations via special legislation, or (2) take the dispute to the Supreme Court of the United States.

China's River of Sorrow

The Yellow River—China's "mother river" and the cradle of Chinese civilization—gets its name from the high amount of silt in its flow. Siltation is so severe that in some downstream areas the riverbed is 10 meters higher than the surrounding farmland, necessitating the creation of extensive dyke systems. This 5,464-kilometer river—China's second longest—passes through nine provinces and supplies water to 12 percent of the country's population and 15 percent of the farmland. This river also is tapped for water diversions to thirsty cities in northern China—most notably numerous emergency transfers to Tianjin since the early 1990s.

Similar to the Mississippi River in the United States, the Yellow River has for centuries been plagued by flood disasters, frequent dyke breaches, and course changes once every ten years. After the 1949 founding of the People's Republic of China, some of the first infrastructure projects were flood control dams and reservoirs along the Yellow River (e.g., Sanmenxia, Liujiaxia, Longyanxia). These dams helped reduce flood threats in the Yellow River Basin and expanded irrigated land. Ironically, since the early 1970s the provinces along the Yellow River have been struggling with severe water shortages, caused by exploding economic development and population growth.

Like the rest of China, urban and rural water users pay very low fees for water and many urban areas have lacked any form of metering. The excessive extraction of water has led to yearly river dry outs since 1972, sparking ever serious conflicts within the basin. Since the mid-1990s the Yellow River has grown so dry it often does not reach the ocean for up to 200 days a year.¹ Besides the damage to industrial and agricultural production, the water shortages have had severe impacts on the natural ecosystem—shrinking of the river's delta has led to a major die off of many fish and plant species in the downstream basin.

The under utilization of water saving measures in the basin has served to exacerbate water shortage conflicts along the Yellow River. For example, in upstream Ningxia and Inner Mongolia farmers still depend on flooding irrigation, which is highly wasteful and has brought them in conflict with the middle and lower reaches where cities, industries, and agriculture also are demanding more water. In 2002 when water flow stopped right before harvest time in Shandong, provincial officials appealed to the central government to force Ningxia and Inner Mongolia to open up reservoirs to quench the thirst of the lower reaches. This informally negotiated reallocation of water ended up damaging upstream crops, fueling more inter-provincial disputes over allocation.²

Since 2002, approximately 63 billion tons of wastewater flows into China's rivers each year.

Paralleling this increasing water scarcity in the Yellow River has been a rapid growth in water pollution—mainly point sources—that has sharpened conflict among provinces over water. Since 2002, approximately 63 billion tons of wastewater flows into China’s rivers each year, of which 62 percent are pollutants from industrial sources and 38 percent are poorly treated or raw sewage from municipalities.³ Although the Yellow River only receives 3.9 billion tons of this wastewater annually, the low flow of the river means water pollution is seriously threatening the “mother river.”⁴

Yellow River Conservancy Commission’s Water Conflict Resolution Functions

Set up in 1955 under the Ministry of Water Resources (MWR), the Yellow River Conservancy Commission (YRCC) is the largest of China’s seven major river basin commissions with 40,000 staff to cover water research, management, and planning throughout the basin. YRCC oversees the implementation and supervision of China’s National Water Law and other MWR regulations and orders in the basin. The YRCC is supposed to adopt a unified management approach in setting water allocation plans and managing major water control projects. Since the 1970s another critical task has been to resolve growing conflicts over water shortages and pollution in the basin.

Over the past several years, MWR has been centralizing the authority to manage water by empowering river basin commissions as water scarcity and pollution challenges have increased in China’s river basins. It merits mention, however, that unlike their U.S. counterparts, the YRCC and other commissions do not have commissioners. Although, in times of crisis and major water allocation planning the YRCC does consult provincial governments, most times the provincial government and other stakeholders are not involved in the regular decision-making in the basin.

In the 1980s, as water conflicts grew in the Yellow River Basin, the State Council ordered research to create a water allocation institution in the basin. After five years of survey work, in 1987 the YRCC calculated the volume of runoff available and set allocation quotas for each province, including a small amount for ecological flows. The plan included a provision that during times of drought the volume of water permitted to each province would decrease by the same percentage. This quota system temporarily mitigated water conflict in the

basin, however, as economic development in the basin boomed in the 1990s the water demand rapidly increased, sparking new conflicts.

Water wastage remains a serious problem in the Yellow River, which the 1987 allocation plan failed to correct because the amount allocated did not push conservation. For example, while still staying within their water allocations, farmers in Ningxia and Inner Mongolia are still using flood irrigation techniques that have exacerbated water shortages downstream. In 1998 the Yellow River went dry for over 200 days, in great part because of the upstream irrigation use. At this crisis stage, the central government ordered the water allocation plan reworked. The 1998 revisions of the quota system decreased allocations by a fixed proportion in times of drought to push conservation and guarantee in-stream flows. Under this new quota system, however, provinces are still permitted to request extra water in times of drought, which has meant the water allocation process is still subject to bargaining and arbitrary reallocations (e.g., the Shandong case described above).

Besides the quota system, since the late 1980s the YRCC has attempted to rationalize water use and decrease conflicts through: (1) creating a new water administration department to oversee allocation planning; (2) establishing a new office that brings

Unlike their U.S. counterparts, the YRCC and other commissions do not have commissioners.

together water quality and water quantity management; (3) improving water withdrawal permitting as well as water use and wastewater emission charges; and (4) coordinating inter-provincial disputes.

Water Administration Department

Following the promulgation of China’s first national Water Law in 1988, the YRCC established the water administration department (WAD) to implement provisions in this new law, as well as deal with increasing water demand and the serious trans-jurisdictional water conflicts. Based on the new Water Law provisions, WAD was tasked with the responsibility of implementing unified water

resource management and allocation, supervising water withdrawal permits, and improving water quality protection in the whole basin. Eventually, WAD offices were set up in all the provinces along the Yellow River to help identify causes of various water conflicts and crises.

Water Resource Protection Department

As the YRCC recognized how growing water scarcity exacerbated pollution conflicts in the basin, they appealed to the State Council to create a new office within the commission. In the early 1990s, the YRCC set up the water resource protection department, which aims to better coordinate the commissions water management activities with the pollution control work carried out by local environmental protection departments in the basin. For the first time researchers from the YRCC and State Environmental Protection Administration are working together on sharing data and other resources to better understand the growing water quality problems in trunk of the Yellow River.

Water Fees, Monitoring, and Water Withdrawal Permits

More than any other river basin commission, the YRCC has been pushing for increases in water use and wastewater emission charges. Increases in fees and the establishment of a real-time water monitoring system along the whole river basin has helped promote better water use efficiency in the basin. The YRCC examines water withdrawal permits once a year. If users exceed permitted withdrawals they will have their extraction levels lowered the next season. In addition, all new medium and large projects that withdraw water must apply to YRCC for permits.

Water Dispute Negotiations

The director of the MWR's Policy and Regulatory Department of China's Gao Erkun, reported in a July 2003 meeting that from 1990 to 2002 over 120,000 water quantity conflicts had been reported to the ministry.⁵ The growing number of water conflicts has made resolution a top priority for the Chinese government. According to China's National Water Law (both 1988 and the 2002 revisions), interregional water disputes are supposed to be resolved through negotiation. If this negotiation fails the conflicting parties should then seek resolution through arbitration by government agencies at the next higher level. In the Yellow River Basin in instances where local governments cannot resolve their water disputes, the

YRCC's Water Administrative Department calls the relevant parties to the table attempting administrative negotiations and coordination to bring the parties to agreement to resolve the dispute. Despite a tremendous commitment of staff, these administrative arbitration methods do not always work and local water and environmental agencies often have difficulty enforcing judgments.

Because of the difficulties in administrative arbitration of water conflicts, the YRCC and other basin commissions have been experimenting with more centralized watershed management systems to assure more effective water allocation and regulation to prevent conflicts from occurring. For example, in addition to measures discussed above, each October since 1999 YRCC has brought together a negotiation meeting to give representatives from provinces and autonomous regions the opportunity to critique the previous year's water allocation plan and put forward proposals for the coming year. Before coming to the table, the representatives survey or consult with their major water users. The meeting aims to reach an acceptable and feasible agreement on the water allocation plan. If the parties fail to agree on the new plan, the documents and summaries of the meetings are submitted to the Ministry of Water Resources for the final decision.

Overall, the YRCC has been particularly successful in managing the whole watershed's water allocations, but ultimately some conflicts persist when disputing parties resent solutions enforced from above. Thus, the YRCC could benefit from the experiences of the DRBC and SRBC to employ more inclusive decision-making mechanisms—including consultation with citizens and nongovernmental organizations (NGOs)—that could help promote better water management and prevent conflicts.

TRANSBOUNDARY RIVER BASIN COMMISSIONS

International Joint Commission

Although domestic water crises have attracted the most attention from citizen groups and local and central government officials, China boasts its fair share of international water problems as well (*Editor's Note: See Transboundary Rivers Box in this special report*). The saliency of cross-boundary water issues increased after the well-publicized chemical spill in the Songhua River affecting Russia as well as China's Heilongjiang Province. As investment and development grow

in northwest China rivers shared with Kazakhstan and Kyrgyzstan also appear ripe for disputes. But the issue does not stop at China's northern border. Its southern neighbors feel the downstream effects of Chinese industrial pollution and water diversion projects on the Mekong and Song Hong rivers. While China's observer status on the Mekong River Basin Commission indicates the Chinese leadership's nominal interest in cross-boundary water issues, the government has yet to implement any significant institutional mechanism to resolve or prevent water conflicts like it has attempted within its domestic river basin commissions. But strong international coordination of rivers is not without precedent and China could learn from the unique cross-boundary relationship between the United States and Canada.

The International Joint Commission (IJC) was established through the Boundary Waters Treaty of 1909, which set forth principles and mechanisms for resolving conflicts and preventing disputes over uses of water crossing the U.S.–Canadian boundary. The commission's basic mandate is to: (1) approve and oversee the operation of specific projects in waters that form across the boundary, (2) oversee the apportionment of certain waters between the two countries, (3) conduct impartial studies based on sound science, and (4) monitor activities to help the two governments prevent and resolve trans-boundary water disputes. The commission also has been asked to alert the two governments about potential problems along the boundary.

The U.S. President and the Canadian Prime Minister each appoint three Commissioners. Unlike other senior government appointees, the Commissioners operate without instructions from the President or Prime Minister to further the individual interests of their respective countries. Instead, they work collectively as independent and objective advisers for both governments regarding the mutual interests of the two countries. The commission reflects the unparalleled cooperative relationship between the two countries. There is true bi-national equality under the treaty and in operations of the commission even though the United States has ten times the population and a much larger economy than Canada. A creation of the treaty, but not a policy instrument of the governments, the IJC is a permanent, objective, independent international unitary body. Decisions are made by consensus, which further strengthens working towards common interests.

The treaty also recognized the interdependence of the two countries in trans-boundary watersheds. Notably, the geographic reality that the trans-boundary waters flow both directions at different points along the border was a powerful incentive to cooperate. For bodies of water that form the U.S.–Canadian border, bi-national approval is required for any dam, diversion or other project that would have a trans-boundary impact on the natural water levels and flows. A bi-national approval generally takes the form of an application for approval submitted to the commission, unless the two countries have a special bilateral agreement that concern specific waters. The commission retains jurisdictions over projects it approves to assure that the spirit of the treaty is followed over time.

The IJC boards—which consist of expert volunteers in related scientific disciplines from federal, state, and provincial agencies, and sometimes from NGOs, industry, and academia—carry out the majority of the commission's technical and policy development. The experts all have access to data in both countries and work collaboratively to determine jointly and impartially the facts related to their assigned tasks. All members participate in their personal and professional capacity and not as representative of their government agencies or employers. At any given time, there are approximately 300 experts currently serving on IJC boards.

Public involvement has been one of the hallmarks of the commission's work. From the very beginning, the treaty required that the IJC give all interested parties convenient opportunity to be heard on any matter before the commission. Public involvement assists the commission in assuring that it is aware of the full range of stakeholder views on all issues where the commission has responsibilities. Informal "town meetings" and formal public hearings provide opportunities to test public reaction for emerging solutions, and forums for an exchange of views among different interest groups within a watershed. The IJC's rules of procedure call for public hearings before the commission reaches final decisions on applications for project approval, and before it submits formal reports or studies to the two governments.

In 1989 Irene Brooks was appointed to serve as the commissioner to the Delaware River Basin Commission. From 1995 to 2002 she served as Pennsylvania commissioner and executive director of the Pennsylvania Department of Environmental Protection's Office for

River Basin Cooperation. In 2002 she was appointed by President George W. Bush as one of the U.S. commissioners for the IJC. She can be reached at IBB1994@aol.com.

Liu Hongxia has worked as a senior engineer in the Yellow River Conservancy Commission (YRCC) since 1994. Within the YRCC Ms. Liu specializes in water resource protection management, scientific, and technological research. She can be reached at: hongxialiu88@yahoo.com.cn.

NOTES

1. Wang Yahua. (2005). "River Governance Structure in China: A Study of Water Quantity/Quality Management Regimes. In Jennifer L. Turner and Kenji Otsuka (Eds.), *Promoting Sustainable River Basin*

Governance: Crafting Japan-U.S. Water Partnerships in China. IDE Spot Survey No. 28 (pp. 23-36). Chiba, Japan: Institute of Developing Economies/IDE-Jetro. [Online]. Available: <http://www.ide.go.jp/English/Publish/Spot/28.html>

2. Wang Yahua. (2003). "Water Disputes in the Yellow River Basin: Challenges to a Centralized System." *China Environment Series*, Issue 6, 94-98.

3. U.S. Department of Commerce, International Trade Administration. (2005). *Water Supply and Wastewater Treatment Market in China*. Washington, DC.

4. China Council on International Cooperation in Environment and Development. (2004). *Promoting Integrated River Basin Management and Restoring China's Living Rivers*. (CCICED Task Force on Integrated River Basin Management Report). Beijing.

5. Hildebrandt, Timothy and Jennifer L. Turner. (2005). "Water Conflict Resolution in China." *China Environment Series*, Issue 7, 99-103.

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SPECIAL REPORT BOX

Transboundary River Tensions— Opportunities for Collaboration

By Juli S. Kim and Michael Murphy

Over the past few years, China's domestic water problems have been making headlines around the world. In the fall of 2004, a coalition of Chinese environmental groups and journalists initiated a campaign demanding more stakeholder participation in evaluating the planning of 13 dams on the Nu River (Nujiang) in Yunnan Province—part of China's Three Parallel Rivers World Heritage Site, which includes the Mekong River. Their campaign for better environmental governance on the Nujiang prompted Premier Wen Jiabao to temporarily halt the dam plans in February 2005, marking a striking victory for Chinese grassroots activists. On 13 November 2005, an explosion at a PetroChina chemical plant in Jilin Province released over a hundred tons of benzene into the Songhua River. The Songhua flows into Heilongjiang Province, through the city of Harbin, before meandering another 600 km through the Russian city of Khabarovsk (the Songhua is the largest tributary of the Heilong River, which is known as the Amur in Russia). Jilin and Harbin officials initially covered up the spill, but once revealed, the local news media was quick to criticize the inadequate local response to the crisis. Although the State Environmental Protection Administration's (SEPA) minister was forced to resign, the disaster sparked stronger rules criminalizing pollution accidents and raised public awareness of China's severe water pollution problems.

In addition to signaling new openness in managing water resources, these two incidents are important in that they both occurred in international river basins where pollution and planned or existing dams already have been creating tensions between China and downstream countries. As the upstream riparian country in the Amur/Heilong and the Nujiang

and Mekong basins, China has not been subject to pressures to collaborate with downstream countries. Although no conflicts have broken out, tensions are growing in these large river basins. As China is moving to reform its domestic water protection laws and institutions, there is now a greater opportunity for international collaboration on protecting these and other transboundary rivers.

MEKONG AND NU RIVER BASINS—CONFLICT AND POTENTIAL COLLABORATION

Originating deep within the Tibetan Plateau, the Mekong traverses through four Chinese provinces, Myanmar, Thailand, Laos, Cambodia, and finally Vietnam before spilling into the South China Sea. At 2,600 miles (4,200 km) the Mekong is the 10th largest river in the world, 7th largest in Asia, and the 3rd most significant in terms of biodiversity (after the Amazon and Congo rivers). Fish and other aquaculture in the Mekong provide about 80 percent of the dietary protein consumed by the 65 million people in the basin. All downstream countries depend on it for irrigating rice and other crops. The Nujiang is one of China's last wild rivers, flowing parallel to the Mekong within China and then into Thailand, and Myanmar; it is the second longest river in Southeast Asia.

The Issues

The Mekong (called the Lancang in China). The Mekong faces an array of problems stemming from growing pollution, damming, and channelization. The Yunnan provincial government plans to build a cascade of eight dams on the Lancang—two are already built and operating (Manwan and

Dachoashan) and three more under construction and potentially seven more in planning. China's dams and destruction of shoals for expanding navigation are driving much of the watershed degradation downstream, leading to considerable erosion of highly fertile land along the river (especially in Laos); sedimentation; acidification of soils in the delta; damaged fisheries from inundation, temperature changes, and pollution (mainly pesticides); rise of waterborne diseases; and growing water supply problems in rural areas along the river, especially Thailand. China's construction of dams along the Mekong/Lancang is being done without consultation with downstream countries. Like many major infrastructure projects in China, these projects lack comprehensive and transparent environmental and social impact assessments (both domestic and transboundary). Lack of transboundary consultation also is true in Cambodia, Thailand, and Vietnam where each country is developing plans for damming tributaries that feed into the Mekong. China's observer status in the Mekong River Commission (MRC) releases it from being committed to protecting downstream interests.

The Nujiang (called the Salween downstream). Despite the national NGO campaign, the Yunnan provincial government is still planning to construct dams on the Nujiang, which represents a major threat to the ecosystem and local livelihoods on the Nujiang (*Editor's Note: see discussion of the Nujiang dam debates in Eng and Ma and Birnbaum and Yu articles in this special report*).

The Stakeholders and Players

- *Government Level:* On the Mekong there are six riparian countries and the MRC (China and Myanmar participate only as observers). On the Nujiang there are three riparian countries, but no transboundary commission exists.
- *Grassroots Level:* In both the Mekong and Nujiang basins there is a growing network of grassroots groups and researchers promoting information sharing, ecosystem studies, citizen empowerment, and capacity building.
- *International Level:* Some of the international NGOs active in promoting sustainable development in these two basins include: International Rivers Network, Oxfam, Conservation International, IUCN, Mekong Watch, The Nature Conservancy, and M-Power. In the downstream Mekong nations, the World Bank, Asia Development Bank, UNDP, GEF, USAID, and

various European governments have been funding a broad range of research, technical assistance, and projects (e.g., pollution control, ecosystem protection, integrated river basin management, and capacity building of the MRC).

The Opportunities for Better Integrated River Basin Management (IRBM) on the Mekong

- The large number of international initiatives and active grassroots networks could help catalyze greater capacity building and commitment from at least the downstream governments to push for stronger IRBM. However, such initiatives are limited without China's commitment to addressing basin-wide impacts of dam and other infrastructure projects upstream.
- The numerous international initiatives pushing greater technical and management capacity within the basin could significantly improve transparency and promote more-informed dialogue on protecting the Mekong.
- It is possible that the internal debate on the Nujiang ultimately could have a major influence on strengthening environmental impact assessments (EIAs) and public participation in decision-making on all dams in China, which could prove advantageous for protecting downstream countries on the Mekong, the Amur, and other transboundary rivers.
- Many of the countries in the basin have EIA laws, but most are weak. Improving these EIA laws could be a fruitful area of collaboration within the basin and open the door for better transboundary impact assessments.

AMUR/HEILONG RIVER BASIN CONFLICT AND POTENTIAL COLLABORATION

The Amur/Heilong River, one of the world's longest rivers with a length of 4,400 km, forms the border between the Russian Far East and China. The Songhua River is the largest tributary of the Amur/Heilong, which meanders through Heilongjiang Province and into Russia ending in the Sea of Okhotsk in the far eastern Khabarovsk Province. 48.2 percent of the river is in China, 42.7 percent in Russia, and 9.1 percent in Mongolia. The Amur, which is the world's longest un-dammed river, drains a remarkable watershed of unique ecosystems that includes diverse landscapes of desert, steppe, tundra, and taiga.

The Issues

Currently, Mongolia, China, and Russia all lay claim to the ever more scarce waters of this mighty river and there has been little collaboration to protect the river. Inadequate enforcement of domestic water protection laws and ineffective transboundary organizations plague proper management of the Amur/Heilong River. In China, increasing withdrawals for agriculture and diversion schemes by dam projects on the tributaries that feed the Amur/Heilong have reduced the volumes and altered the timing of flow—disrupting agriculture and fisheries in Mongolia and Russia. The Chinese government has proposed a large cascade of dams along the Amur/Heilong River, a project which is opposed by many local people on the Russian side of the border. Weak pollution control enforcement in China continues to pollute the river's tributaries, straining relations with Russia. Since the Songhua River spill in November 2005, Russian governors downstream have been more vocal about their anger with Chinese water pollution contaminating the Amur and endangering public health.

The Stakeholders and Players

- *Government Level:* On the Amur there are national and regional/provincial governments of China, Russia, Mongolia, and the Amur/Heilong River Basin Management Council.
- *Grassroots Level:* Networking and coordination among domestic grassroots NGOs is not as strong in this basin as in the Mekong/Nujiang basins. However, there is a large network of strong environmental NGOs and scientific institutes on the Russian side of the border and they are eager to cooperate with Chinese counterparts. Some international exchanges have started between Russian and Chinese public organizations.
- *International Level:* WWF-China and WWF-Russia are encouraging communication between riparian countries; Pacific Environment has brought together NGOs and researchers on both sides to study natural resources issues in the basin; GEF and UNEP are designing an integrated management project specific to the Amur/Heilong River Basin; and International Crane Foundation, Wetlands International, and Wildlife Conservation Society have all been promoting broader nature conservation between Russia and China.

The Opportunities for Stronger Integrated River Basin Management on the Amur/Heilong

- The Chinese government has strongly pushed a joint anti-poaching (fish) agreement on the Russian side of the river basin, while governors in the Russian Far East have demanded China undertake measures to more strictly control pollution coming from the Songhua River as well as revising its dam projects. Progress on these issues has been small, in part because initiatives for protecting the river are carried out by a variety of agencies on both sides without coordination or strong national government support from the Chinese side.
- Following calls by WWF for urgent action to protect the unique wetlands of the Amur, over 180,000 hectares of new protected areas have been created between 1999 and 2001. Today, up to 22 percent of the Amur River basin wetlands on the Russian side are protected.
- In the 1990s, the National Committee on U.S.-China Relations worked with parties on both sides of the border to create the Chinese-Russian Ussuri Sustainable Land Use Plan. This document called for the creation of an international governance mechanism to protect the Amur and the Ussuri (a tributary) with Russian-Chinese scientific and government collaboration. This plan was never implemented, but it lays the groundwork for future initiatives.
- There are great incentives for all the agencies working on the same problems to join forces because both China and Russia are suffering losses inflicted by the other.
- A bilateral Amur coordinating council was created by Russia and China five years ago as a means to discuss pollution issues, as well as the territorial dispute associated with the islands near Khabarovsk. The council has provided some important bilateral linkages, but has failed to address key underlying issues that led to the growing water pollution flowing from China into Russia. Nevertheless it represents a potentially useful institution from which international programs (such as the planned GEF/UNEP project) could lay the foundation for the joint management of the resources of the basin.

FEATURED MEETING SUMMARY

Cooperation or Competition for Energy: China and the North American Response

By Jennifer L. Turner

29 March 2006

On 29 March 2006, the Wilson Center's CHINA ENVIRONMENT FORUM and CANADA INSTITUTE cosponsored a panel discussion on the growing tensions in North America regarding China's expanding search for oil resources. In his discussion of China's growing energy security concerns, **Xavier Chen** (BP China) explained that paralleling China's sustained 57 percent GDP growth since 2000 has been an almost 100 percent

increase in energy consumption. This booming demand has produced growing energy shortages throughout the country, which has led the government to focus on energy diversification and development. Besides investments in new infrastructure and a renewed focus on nuclear, renewables, and natural gas, the Chinese government has increased oil imports and encouraged its national oil companies to expand exploration around the globe. **Wenran Jiang** (University of Alberta) discussed Canada's openness to Chinese energy investment and its potential as a source of oil exports to Asian markets in the long run, but remarked that Canada's energy industry remains geared to the U.S. market given the proximity, cost, and current refining capacity. **Jeff Logan** (World Resources Institute) explained the dynamics underpinning U.S. concerns over China's impact on the global oil markets. Logan stressed, however, that both the U.S. and Chinese



Xavier Chen

economies are intertwined to such an extent that their respective dependence on oil—the two countries account for one-third of global oil consumption—requires collaboration on the part of both governments to assuage each country's concerns over energy security.

CHANGING CONTEXT OF SINO-U.S. ENERGY RELATIONS

To highlight the considerable energy hunger by the United States and China, Logan began his talk noting that during the two hours we would be in the meeting, the United States would consume 1.275 million barrels of oil and China would consume 1.5 million tons of coal.

Global oil markets have been extremely insecure for the last three years due to tremendous demand growth and supply instability; the result has been much higher prices. Logan stated that these tight markets are likely the beginning of a more permanent cycle. The United States and other countries have become increasingly dependent on the Middle East for oil, particularly Saudi Arabia, which is not a solid base for economic security. The United States is hoping production in Saudi Arabia will double in the next 25 years, but it is not clear if this is feasible. Thus, disruptions and general insecurity over supply are likely to increase in the future. It is this insecure



Wenran Jiang

context that has made policy-makers in the United States and other countries even more concerned about China's impact on global oil markets. Chinese oil demand growth has averaged over 7 percent annually since 2000, yet U.S. consumption is still three times as much as China. Global oil demand is projected to grow from 84 million barrels a day (mb/day) to 115 mb/d in 2030,

which is unsustainable in terms of supply and impact on the global climate.

Over the past few years the world has seen a rise in hurricane intensity and other weather catastrophes, which many scientists attribute to global warming. To mitigate these changes, one target is to limit the rise of the global mean temperature to two degrees Celsius (35.6 degrees Fahrenheit). To reach this stabilization, global CO₂ emissions must start declining over the next 15 years, demanding major changes from China and the United States, the two leading CO₂ emitters in the world. China, like the United States, would need to make dramatic changes to its energy policies and infrastructure to decrease its CO₂ emissions. There are estimates that 7 percent of China's CO₂ emissions are due to production of U.S. imports, which highlights how the "problem" is not simply China's energy hunger, but the hunger of U.S. consumers for cheap products from China.

When China's oil demand rose by 25 percent in the second quarter of 2004, some China watchers pondered whether this was a sign of a coming war. Logan noted that while China's oil consumption will be increasing over time, it appears that 2004 was just a temporary peak to provide oil for backup power generation during an electricity shortage. Despite a fairly significant decline in oil consumption since 2004, Chinese national oil companies continue to increase investments overseas and their dealings with states such as Iran and Sudan have raised concerns in Washington. Because Chinese oil companies have entered the market late, some of the few areas in which they can invest are what the United States perceives as "unstable" regimes. China's oil hunger and overseas acquisition binge also are seen as sources of high global oil prices and destabilization of oil markets. However, China's overseas oil investment could be viewed as part of its integration into the world economy and not

necessarily a threat. For example, 90 percent of Chinese oil is currently sold in international markets and is not being shipped back to China.

Besides investing in oil developments in Africa, Latin America, and the Middle East, China has joined with India in bidding for oil concessions. Moreover, the Chinese government is building strategic relations with Kazakhstan to obtain more natural gas pipelines, as well as competing with Japan for Russian gas and oil.

Internal Challenges Driving China's Energy Hunger

China's growing energy hunger—particularly illustrated by international oil investments—has sparked considerable rhetoric and antagonism between China and the United States. The current tension surrounding China's oil hunger is driven in part by a lack of understanding of what shapes China's energy security. Specifically, China is the: (1) third largest energy importer; (2) second largest CO₂ and largest SO₂ emitter; (3) fourth largest economy; and (4) fourth largest FDI stock. These statistics reveal how China's emergence as the world's factory has produced a rapid and high-energy consuming growth, which is also damaging the environment. Notably, international investment has pushed energy consumption in China in that it has been one of the largest drivers of economic growth (accounting for 35 percent of growth between 1983 and 2003).

China has sufficient capital and labor to continue its rapid growth, but natural resources—water, energy, minerals, and arable land are in limited supply—lack of energy and mineral resources are considered major bottlenecks for economic growth in China. One worrisome trend for the Chinese leadership is that energy consumption has grown nearly twice as fast as GDP since 2000. Continued high growth is needed to help reduce the large income gap between rural and urban citizens, which is catalyzing increasing social unrest. The pressure for cleaner growth is increasing as well.

Much of China's air pollution stems from the country's heavy dependence on coal, which contributes to about 70 percent of its energy mix. Besides coal, China's exploding car population is a major source of local air pollution and CO₂ emissions. To diversify its energy sources, the Chinese government has been investing more in natural gas, renewable, and energy efficiency projects. For example, as a means to attain the goals in the Eleventh Five-Year Plan to reduce energy consumption by 20 percent, major



Jeff Logan

cities like Beijing are undertaking extensive programs to retrofit their buildings to make them energy efficient. Currently it is political willingness, rather than the market that is creating demand for more efficient buildings and the potential benefits are great, seeing that 99 percent of existing and 95 percent of new buildings in China are not energy efficient.

To help address energy security challenges, the Chinese government also has pushed some very progressive policies: (1) a 20 percent reduction in energy use per GDP by 2010 as a compulsory target for all levels of government; (2) resource saving as a basic national policy—one notable target is to reduce water use by 30 percent by 2010 (water conservation also promotes considerable energy savings); (3) industries are supposed to reduce pollution discharge by 10 percent by 2010; and (4) renewable energy use requirements are increasing for all industries and government entities. These policies open up numerous opportunities for international collaboration that could promote energy security in China and globally.

Another part of the Chinese government's energy diversification strategy is to build 32 nuclear reactors by 2020. This goal would entail installing two nuclear reactors each year, which is currently beyond the country's financial capability. Even if China reaches its 2020 goal, nuclear power would just be 4 percent of the total energy mix. Despite measures to increase energy efficiency and develop renewable and nuclear energy sources, China will remain dependent upon coal and growing oil imports for the foreseeable future.

Canada-China Energy Relations

CNNOC's 2005 bid for Unocal sparked vocal opposition in Congress, however, in contrast Wenran Jiang noted Canada's relative openness to Chinese investments in its energy sector. China and other Asian countries are particularly interested in Alberta, which is ranked as having the second largest crude oil reserve in the world

next to Saudi Arabia. A report issued in early 2006 in Beijing made an estimate that by 2015, nearly 2.1 million barrels a day could be exported from Canada to Asia, significantly reducing the volume going through the Strait of Malacca and lowering Asia's dependency on Middle Eastern oil. Over the past few years, Chinese companies and officials have undertaken many oil investment discussions with their Canadian counterparts. Despite extensive talks and some bilateral agreements, China has yet to strike a major deal in Canada. Moreover, while the potential of exporting oil to Asian markets is attractive, Canada's energy industry remains geared towards the U.S. market.

Although the Chinese market is attractive for exporting oil, if China does not improve its energy efficiency—for every \$1 of GDP, China uses 4.7 times as much energy as the United States—China's daily supply for oil could reach 80 million barrels, which is not sustainable. Instead of viewing China's energy hunger as a crisis, Canada and the United States should see it as a great opportunity for assisting China in improving its energy efficiency.

Promoting Energy Collaboration

China's energy security challenges are wider and more profound than is often perceived. China cannot have energy security without world energy security and visa-versa. The consensus among the speakers and the audience at this meeting was that opportunities exist for diffusing tensions over China's energy demands, both through assistance in promoting energy efficiency and in involving China in multilateral institutions. Such collaboration—particularly between the United States and China—could ensure international oil market security and significantly reduce greenhouse gas emissions.

Logan felt the United States should act first to constructively promote such collaboration. For example, the United States could adopt some measures to lessen U.S. dependence on oil (e.g., CAFÉ, fuel tax, or biofuels) and assist China on improving their energy data collection and analysis. Such steps could help open the door for a serious dialogue on shared energy concerns and lay the foundation for more proactive steps, such as getting China on a fast-track International Energy Agency membership and undertaking a dialogue on how China could adopt some kind of carbon commitment. Collaboration between North America and China could help to positively guide China's emergence into the world system.

Evaluating Three Gorges Dam Resettlement Policies

By Laura A. Safdie

Although the Three Gorges Dam (TGD) is expected to bestow significant benefits in terms of flood control, electricity supply, and navigation improvement, this huge project has been plagued by controversy. The sheer magnitude of necessary funds that will reach an estimated 203.9 billion Yuan (\$24.6 billion) is a central concern. Another controversy is the dam's expected negative impact on the environment, local culture, and scenic beauty. However, as in most large hydropower projects, the most volatile debate revolves around forced resettlement, which in TGD will displace more people than any other development project in history. Such large-scale involuntary resettlement poses significant risks of impoverishment, homelessness, and health threats to both resettled and host communities. To evaluate whether TGD resettlement policies succeed in countering these risks, during a summer research trip to China with Michigan State University, I analyzed resettlement and rehabilitation policies and conducted surveys of displaced families in the urban resettlement area in Wanzhou district of Chongqing municipality. Due to time constraints I only surveyed twelve families, which means this study only offers a glimpse of the multifaceted issues at play in the TGD.

Individuals I surveyed initially were resettled with landholdings of smaller plot size and inferior quality than their previous farms. Crop yield thus generally decreased, indicating that even rural households furnished with land were expected to generate a portion of their income from off-farm jobs. Without any formal training, however, most formerly rural households resorted to temporary service jobs where available. Unless these households were able to take advantage of business opportunities such as selling their small agricultural plots to developers, individuals surveyed indicated uncertainty about current and future ability to generate income.

Joblessness

In 2004, the National Development and Reform Commission (NDRC) created a strategy for social and economic development for the regions affected by the dam, prioritizing industrial growth as key in reducing poverty. NDRC's Cooperative Partnership program created business relationships between counties affected by the TGD and coastal provinces, which are legally required to transfer industrial factories and capital investments to their inland partner counties. Wanzhou has developed partnerships with Shanghai, Zhejiang, and Fujian, and corporations from these areas are already making substantial investments. This program and other preferential business policies have attracted a total investment of 4 million Yuan into the Wanzhou district between 2002 and 2004. Wanzhou has attempted to prioritize less polluting industries, such as salt production, pharmaceutical and food product manufacturing, and related light industries.

The second national measure to combat joblessness in the TGD area is an exchange of trained, temporary service labor from the region to cities in the east. Wanzhou currently has an employment contract with Shanghai, which provided service jobs for 10,000 of Wanzhou's unemployed from 2003 to 2005. County government agencies train displaced urban workers according to the needs of Shanghai's labor market, with all expenses covered by the central government. While the central government has initiated numerous policies promoting development and implemented regulations to improve the business environment in areas affected by the dams, these are all macro-scale risk mitigation strategies that actually have not reached most resettled citizens. Of the twelve surveyed resettled households, only one had been given access to basic occupational training at any point in the resettlement process.

Homelessness

Despite economic development policies targeting resettled peoples, problems of unemployment and homelessness still exist in the dam region. Often families are provided with vacant land plots in a resettlement village, or “new town,” with limited infrastructure and civic amenities. In this scenario, more common in earlier phases of resettlement, new residents are responsible for constructing their own housing with variable access to loans and financial resources. Later in resettlement, however, land became increasingly scarce and larger groups of people had to be relocated quickly as the reservoir level rose. These individuals were given opportunities to buy apartments in specially built government subsidized high rises or forego housing replacement entirely.

Rebuilding Living Communities

While economic development is correctly considered the primary strategy for post-resettlement household rehabilitation, the impacts of losing social networks cannot be underestimated. Large-scale resettlement breaks apart community and family networks, removing support systems and even resources to maintain livelihoods. Social reintegration depends both on the relationships between resettled and host communities and the evolving dynamics within the resettled communities. Resettled individuals in my survey cited feelings of alienation; yet those who took the initiative to join social organizations admitted that they were helpful in integrating them into the new community.

Improving Healthcare

Wanzhou, like most urban resettlement centers in the TGD area, has invested heavily in healthcare infrastructure. Access to healthcare is an important indicator of poverty levels, and therefore was a major component of my survey interviews. Notably, even low-income families surveyed experienced better healthcare services after resettlement than before. The large number of resettled rural citizens into urban areas like Wanzhou appears to have given more households access to healthcare, as well as educational opportunities. Ability to take advantage of this access, however, depends largely on the community's economic rehabilitation capacity. Resettlement policies, then, must include sufficient assurances for the secure, long-term employment of those people unable to take advantage of their agricultural skill base. In the case of healthcare, for example, resettlement packages do not include an allocation for health insurance and those who fall

into impoverishment cannot take advantage of their improved proximity to medical care.

Policy Recommendations

While Wanzhou is a relatively well-off district, many resettled individuals still struggle to find jobs, which means the fundamental criteria for successful resettlement has not been achieved. Fundamental to successful resettlement is the ability for people to generate income, which could be assured by providing access to low interest loans for small-scale entrepreneurship. With the opportunities that arise from such financing, households can develop a secure source of income separate from government training programs, which sometimes fall short. For example, some households that were provided with a vacant land plot on which to construct housing were able to borrow money to construct multiple-family dwellings, thereby enabling them to rent inexpensive housing to other residents and ensuring a supplementary source of income.

China's political system is not known for involvement of the public in the creation or execution of policies, and accordingly, plans for resettlement are formulated with minimal input from the people who are most affected by their outcomes. In resettlement projects for dams, consultation with the public about the execution of involuntary resettlement is vital. Active participation at all stages of resettlement would serve more than a symbolic function; by involving displaced people in resettlement decisions, communities would begin to feel personally invested in their success. There are over 200 new dams being planned in southwest China, thus it is vital that dam builders and local governments solicit input from communities on dam site decision-making, rehabilitation programs, resource allocation, and resettlement sites. This community empowerment, not heavy-handed top-down relocation, will prevent conflicts before they arise, making implementation and enforcement of resettlement policies successful and less expensive. Alternately such consultation could halt some dams, which will be seen as too expensive if the true costs of resettlement are incorporated into the final price tag.

Laura Safdie is an undergraduate at University of Berkeley and wrote a longer version of this paper during her participation in the P.R.E.M.I.U.M. Research Experience for Undergraduates sponsored by the National Science Foundation and Michigan State University. She can be reached at: lsafdie@berkeley.edu.

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